TRANSCONA COMMUNITY AIR QUALITY MONITORING STUDY

LOCATION OF ENVIRONMENTAL AIR QUALITY SAMPLERS:
ÉCOLE REGENT PARK (July 20 to December 29, 2003)
BERNIE WOLFE SCHOOL (January 1 to April 10, 2004)
JOSEPH TERES SCHOOL (April 14 to July 15, 2004)
ÉCOLE MARGARET UNDERHILL (July 19 to October 25, 2004)
543 PANDORA AVENUE WEST (November 15, 2004 to March 8, 2005)

APPENDICES

By Jean Van Dusen, M.A.Sc., P.Eng.
December 2006

Report No. 2006-01

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Manitoba Conservation

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List of Abbreviations

CAC	criteria air contaminant
CO	carbon monoxide
CO_2	carbon dioxide
E	east
EDXRF	energy dispersive X-ray fluorescence
g TEQ/yr	grams of dioxins/furans (as toxic equivalents) per year
GC/MS	gas chromatography/mass spectrometry
km/hr	kilometres per hour
n	number of matching samples
N	north
NO_x	nitrogen oxides
NPRI	National Pollutant Release Inventory
p	correlation coefficient
PM	particulate matter
PM_{10}	particulate matter 10 micrometer or smaller in diameter
$PM_{2.5}$	particulate matter 2.5 micrometer or smaller in diameter
PM_C	particulate matter between 2.5 and 10 micrometer in diameter
S	south
SO_x	sulphur oxides
TEOM	tapered element oscillating microbalance
TPM	total particulate matter
VOC	volatile organic compound
W	west
$\mu g/m^3$	micrograms per cubic meter
μm	micrometer

Appendix A. Annual Air Emissions Data from the National Pollutant Release Inventory (NPRI)

Table A.1 NPRI Air Emissions Data

Industrial Facility	NPRI Pollutant[1]	Annual Air Emissions in (tonnes/year)	
		Year 2000	Year 2003[3]
Transcona			
Border Chemical Company Limited	Ammonia	0.010[2]	0.006[2]
	Sulphuric acid	6.180	6.180
	Vanadium	Not reported[4]	0.000
	Sulphur dioxide	CACs not reported in 2000[5]	1043.5
Canadian National Railway	Xylene (all isomers)	No NPRI report[6]	23.2
	VOCs	CACs not reported in 2000	75.524
Griffin Canada Inc.	Chromium (and its compounds)	Not reported	0.005
	Dioxins/Furans	0.071 g TEQ/yr	0.000 g TEQ/yr
	Hexachlorobenzene	0.000 g	0.000 g
	Manganese (and its compounds)	0.140	0.043
	Zinc (and its compounds)	Not reported	0.000
	PM_{10} (Particulate matter 10 µm or less in diameter)	CACs not reported in 2000	6.193
	$PM_{2.5}$ (Particulate matter 2.5 µm or less in diameter)	CACs not reported in 2000	6.193
Kitchen Craft of Canada	i-Butyl alcohol	21.000	Not reported
	Isopropyl alcohol	31.000	15.210
	Methanol	17.000	26.130
	Methyl ethyl ketone	Not reported	36.900
	n-Butyl alcohol	12.000	22.650
	Toluene	80.000	134.070
	Xylene (all isomers)	46.000	53.810
	Carbon monoxide (CO)	CACs not reported in 2000	329.823
	Nitrogen oxides (NO_x)	CACs not reported in 2000	6.732
	Total Particulate Matter (TPM)	CACs not reported in 2000	347.939
	PM_{10}	CACs not reported in 2000	340.067
	$PM_{2.5}$	CACs not reported in 2000	0.081
	Sulphur dioxide	CACs not reported in 2000	0.276
	Volatile Organic Compounds (VOCs)	CACs not reported in 2000	860.700
New Flyer Industries Inc.	1,2,4-trichlorobenzene	Not reported	14.600
	1,2,4-Trimethylbenzene	10.832	Not reported
	Chromium (and its compounds)	0.001[2]	Not reported
	Copper (and its compounds)	0.000	0.000
	Manganese (and its compounds)	0.000	Not reported

Industrial Facility	NPRI Pollutant[1]	Annual Air Emissions in (tonnes/year)	
		Year 2000	Year 2003[3]
New Flyer Industries Inc. (continued)	Methyl ethyl ketone	13.282	Not reported
	Methylenebis(phenylisocyanate)	0.000	Not reported
	n-Hexane	Not reported	14.489
	Toluene	10.894	41.122
	Xylene (all isomers)	18.343	Not reported
	Zinc (and its compounds)	0.000	379.380
	VOCs	CACs not reported in 2000	176.707
Palliser Furniture Ltd. – Logic Division	PM_{10}	CACs not reported in 2000	1.574
	$PM_{2.5}$	CACs not reported in 2000	0.813
Palliser Furniture Ltd. – Particle Board Plant/Panel Supply Plant	VOCs	CACs not reported in 2000	51.068
PlastiFab Ltd.	VOCs	CACs not reported in 2000	63.730
Westland Steel Products Ltd.	Hexavalent chromium compounds	No NPRI report required in 2000	0.0 kg
	VOCs	CACs not reported in 2000	6.500
Kildonan			
City of Winnipeg, Water and Waste Department	Ammonia (total)	0.000	151.593
	Cadmium (and its compounds)	Not reported	0.00 kg
	Chlorine	0.000	Not reported
	Copper (and its compounds)	0.000	0.00
	Lead (and its compounds)	Not reported	0.00 kg
	Mercury (and its compounds)	0.000 kg	0.00 kg
	Zinc (and its compounds)	0.000	0.00
North Star/Fairmont Plating Ltd.	Hexavalent chromium compounds	No NPRI report required in 2000	0.0 kg
	Lead (and its compounds)	No NPRI report	0.0 kg
Palliser Furniture Ltd. – DeFehr Division	t-Butyl alcohol	24.160	10.295
	Methanol	11.320	Not reported
	Methyl ethyl ketone	41.460	Not reported
	Toluene	121.153	26.970
	Xylene (mixed isomers)	28.761	Not reported
	PM_{10}	CACs not reported in 2000	0.823
	$PM_{2.5}$	CACs not reported in 2000	0.500
	VOCs	CACs not reported in 2000	181.968
St. Boniface			
Champ Industries	Nickel (and its compounds)	No NPRI report	0.00
	TPM	CACs not reported in 2000	22.219
	PM_{10}	CACs not reported in 2000	22.219

Industrial Facility	NPRI Pollutant[1]	Annual Air Emissions in (tonnes/year)	
		Year 2000	Year 2003[3]
Craftline Countertops	PM_{10}	CACs not reported in 2000	14.055
Custom Castings Ltd.	Zinc (and its compounds)	0.000	Not reported
Falcon Machinery (1965) Ltd.	Hydrochloric acid	0.000	0.000
	Zinc (and its compounds)	0.000	0.000
Frank Fair Industries Ltd.	Styrene	39.930	44.212
Guertin Bros. Coatings and Sealants Ltd.	Butyl benzyl phthalate	0.100[2]	0.100
	Chromium (and its compounds)	0.100[2]	0.100
	Ethylene glycol	0.100[2]	0.100
	Lead (and its compounds)	0.100[2]	7.000 kg
	Methanol	1.800	1.050
	Toluene	1.700	1.460
	Xylene (all isomers)	7.170	4.940
	Zinc (and its compounds)	0.100[2]	0.100
	TPM	CACs not reported in 2000	0.018
	PM_{10}	CACs not reported in 2000	0.018
	$PM_{2.5}$	CACs not reported in 2000	0.018
	VOCs	CACs not reported in 2000	9.250
HCl Canada Inc. (2000) Brenntag Canada Inc. (2003)	2-Butoxyethanol	0.001[2]	0.003[2]
	Chlorine	0.000	0.001[2]
	Dichloromethane	Not reported	0.013[2]
	Ethylbenzene	0.018[2]	0.001[2]
	Ethylene glycol	0.001[2]	0.000
	Formic acid	0.001[2]	0.001[2]
	Hydrochloric acid	0.014[2]	0.002[2]
	Isopropyl alcohol	0.059[2]	0.038[2]
	Methanol	0.304[2]	0.216[2]
	Methyl ethyl ketone	0.148	0.273[2]
	n-Butyl alcohol	0.001[2]	Not reported
	n-Hexane	0.242[2]	0.095[2]
	Nitric acid	0.001[2]	0.000
	Phosphoric acid	0.000	Not reported
	Phosphorous (total)	Not reported	0.000
	Toluene	0.087[2]	0.060[2]
	Trichloroethylene	Not reported	0.004[2]
	Xylene (all isomers)	0.048[2]	0.010[2]
IKO Industries Limited	PM_{10}	CACs not reported in 2000	1.449
	$PM_{2.5}$	CACs not reported in 2000	1.163
Interprovincial Cooperative Ltd.	Copper (and its compounds)	Not reported	0.000
	Diethanolamine (and its salts)	0.100	0.210
	Dimethylamine	0.100	0.053
	Manganese (and its compounds)	Not reported	0.000
	Octylphenol and its ethoxylates	Not reported	0.000

Industrial Facility	NPRI Pollutant[1]	Annual Air Emissions in (tonnes/year)	
		Year 2000	Year 2003[3]
Interprovincial Cooperative Ltd. (continued)	Xylene (all isomers)	0.100	0.067
	Zinc (and its compounds)	Not reported	0.000
Lafarge Canada Inc.	PM_{10}	CACs not reported in 2000	1.372
Landmark Feeds	Copper (and its compounds)	No NPRI report	0.0
	Phosphorous (total)	No NPRI report	0.0
	Selenium (and its compounds)	No NPRI report	0.0
	Zinc (and its compounds)	No NPRI report	0.0
	PM_{10}	CACs not reported in 2000	0.569
Maple Leaf Consumer Foods	Ammonia	Not reported	1.050
Phillips & Temro Industries Ltd.	Copper (and its compounds)	0.000	0.000
PPG Phillips Industrial Coatings	2-Butoxyethanol	Not reported	0.153
	Chromium (and its compounds)	Not reported	0.001
	Isopropyl alcohol	Not reported	0.194
	Lead (and its compounds)	Not reported	0.013 kg
	Methyl ethyl ketone	Not reported	0.147
	Methyl isobutyl ketone	0.379	0.600
	n-Butyl alcohol	0.643	0.321
	Toluene	Not reported	0.242
	Xylene (all isomers)	9.726	9.024
	Zinc (and its compounds)	Not reported	0.001
	VOCs	CACs not reported in 2000	18.486
Ridley Inc.	Copper (and its compounds)	0.000	0.000
	Manganese (and its compounds)	0.000	0.000
	Zinc (and its compounds)	0.000	0.000
Royal Canadian Mint	Chromium (and its compounds)	0.002	Not reported
	Copper (and its compounds)	0.027	0.073
	Manganese (and its compounds)	0.013	Not reported
	Nickel (and its compounds)	0.055	0.045
	Sulphuric acid	0.000	0.120
	Zinc (and its compounds)	0.075	0.004
	PM_{10}	CACs not reported in 2000	0.814
	$PM_{2.5}$	CACs not reported in 2000	0.814
Shell Canada Products	1,2,4-trimethyl benzene	No NPRI report	0.051
	Ethyl benzene	No NPRI report	0.300
	n-Hexane	No NPRI report	2.304
	Toluene	No NPRI report	1.548
	Xylene (all isomers)	No NPRI report	0.436
	VOCs	CACs not reported in 2000	420.039
East St. Paul			
Imperial Oil	1,2,4-trimethyl benzene	No NPRI report	0.205
	Benzene	No NPRI report	1.250
	Ethyl benzene	No NPRI report	0.218

Industrial Facility	NPRI Pollutant[1]	Annual Air Emissions in (tonnes/year)	
		Year 2000	Year 2003[3]
Imperial Oil (continued)	n-Hexane	No NPRI report	6.024
	Toluene	No NPRI report	2.720
	Xylene (all isomers)	No NPRI report	0.797
	VOCs	No NPRI report	571.846

[1] A facility is required to report those pollutants which it manufactures, processes or otherwise uses in quantities above a set threshold (usually 10 tonnes).

[2] Emission route unspecified. If a facility releases less than 0.1 tonnes/year of a pollutant, the facility has the option of not specifying the media that the pollutant is being discharged to (*i.e.*, air, water or land).

[3] Year 2004 NPRI data are available but are only preliminary and have not yet been reviewed by Environment Canada.

[4] "Not reported": the facility had submitted an NPRI report in the given year but the specific contaminant was not included in its emissions inventory.

[5] The first reporting of Criteria Air Contaminants (CACs) by facilities occurred in 2002.

[6] "No NPRI report": the facility had not submitted an NPRI report in the given year.

Reference: Environment Canada. National Pollutant Release Inventory (NPRI). http://www.ec.gc.ca/pdb/npri/npri_home_e.cfm

Appendix B. Particulate Matter Constituents Analysis List

The constituents for which the $PM_{2.5}$ and PM_{10} samples were analyzed are listed in Table B.1.

Table B.1 Constituents Analyzed in Transcona Particulate Matter Samples

Chemical Name	Chemical Symbol	Chemical Name	Chemical Symbol
Aluminum	Al	Neodymium	Nd
Antimony	Sb	Nickel*	Ni
Arsenic	As	Niobium	Nb
Barium	Ba	Palladium	Pd
Bromine	Br	Phosphorous*	P
Cadmium*	Cd	Potassium	K
Calcium	Ca	Praseodymium	Pr
Cerium	Ce	Rubidium	Rb
Cesium	Cs	Scandium	Sc
Chloride*	Cl	Selenium*	Se
Chromium*	Cr	Silicon	Si
Cobalt	Co	Silver	Ag
Copper*	Cu	Sodium	Na
Gallium	Ga	Strontium	Sr
Germanium	Ge	Sulphur	S
Indium	In	Tellurium	Te
Iodine	I	Tin	Sn
Iron	Fe	Titanium	Ti
Lanthanum	La	Tungsten	W
Lead*	Pb	Vanadium*	V
Magnesium	Mg	Yttrium	Y
Manganese*	Mn	Zinc*	Zn
Mercury*	Hg	Zirconium	Zr
Molybdenum	Mo		

*Constituents identified as being manufactured, processed or otherwise used by NPRI industrial facilities within the Transcona area.

Reference: Environment Canada Environmental Technology Centre. Multi-element Analysis of Ambient Aerosols Using Energy Dispersive X-ray Fluorescence Spectrometry. Method No.: 6.09/2.0/M. September 8, 2006.

Appendix C. Volatile Organic Compounds (VOC) Analysis List

The VOCs analyzed in the SUMMA canister air samples are listed in Table C.1.

Table C.1 Volatile Organic Compounds (VOCs) Analyzed in Transcona Air Samples

VOC Species	VOC Species
1,1,1-Trichloroethane	2,2,4-Trimethyl pentane
1,1,2,2-Tetrachloroethane	2,2,5-Trimethyl hexane
1,1,2-Trichloroethane	2,2-Dimethyl butane
1,1-Dichloroethane	2,2-Dimethyl hexane
1,1-Dichloroethylene	2,2-Dimethyl pentane
1,2,3-Trimethylbenzene	2,2-Dimethyl propane
1,2,4-Trichlorobenzene *	2,3,4-Trimethyl pentane
1,2,4-Trimethylbenzene *	2,3-Dimethyl butane
1,2-Dichlorobenzene	2,3-Dimethyl pentane
1,2-Dichloroethane	2,4-Dimethyl hexane
1,2-Dichloropropane	2,4-Dimethyl pentane
1,2-Diethylbenzene	2,5-Dimethyl heptane
1,3,5-Trimethylbenzene	2,5-Dimethyl hexane
1,3-Butadiene	2-Butanol
1,3-Dichlorobenzene	2-Butanone (Methyl ethyl ketone, MEK) *
1,3-Diethylbenzene	2-Butenal (Crotonaldehyde)
1,4-Dichlorobenzene	2-Ethoxy-2-Methyl-Propane (ETBE)
1,4-Dichlorobutane	2-Ethyl-1-Butene
1,4-Diethylbenzene	2-Ethyl toluene
1-Butanol *	2-Methoxy-2-Methyl-Propane (MTBE)
1-Butene and Isobutene	2-Methyl Furan
1-Butyne	2-Methyl Propanal (Isobutyraldehyde)
1-Decene	2-Methyl-1-butene
1-Heptene	2-Methyl-1-Pentene
1-Hexene	2-Methyl-2-butene
1-Methyl cyclohexene	2-Methyl-2-Pentene
1-Methyl cyclopentene	2-Methyl-2-Propenal (MAC)
1-Nonene	2-Methyl heptane
1-Octene	2-Methyl hexane
1-Pentene	2-Methyl pentane
1-Propanol (propyl alcohol)	2-Pentanone
1-Propyne	2-Propenal (Acrolein)
1-Undecene	2-Propene Nitrile (Acrylonitrile)
2,2,3-Trimethyl butane	3,6-Dimethyl octane

VOC Species	VOC Species
3-Buten-2-one (Methyl vinyl ketone,-MVK)	cis-1,3-Dichloropropene
3-Ethyl toluene	cis-1,3-Dimethylcyclohexane
3-Methyl Butanal (Isovaleraldehyde)	cis-1,4 and trans-1,3-Dimethylcyclohexane
3-Methyl-1-butene	cis-2-Butene
3-Methyl-1-pentene	cis-2-Heptene
3-Methyl heptane	cis-2-Hexene
3-Methyl hexane	cis-2-Octene
3-Methyl octane	cis-2-Pentene
3-Methyl pentane	cis-3-Heptene
4-Ethyl toluene	cis-3-Methyl-2-pentene
4-Methyl-1-pentene	cis-4-Methyl-2-pentene
4-Methyl heptane	Cyclohexane
4-Methyl octane	Cyclohexanone
Acetaldehyde	Cyclohexene
Acetone	Cyclopentane
Acetonitrile	Cyclopentanone
Acetylene	Cyclopentene
alpha-Pinene	Decane
Benzaldehyde	delta-Limonene
Benzene	Dibromochloromethane
Benzyl chloride	Dibromomethane
beta-Pinene	Dichloromethane (Methylene Chloride) *
Bromochloromethane	Dodecane
Bromodichloromethane	Ethane
Bromoform	Ethanol
Bromomethane	Ethyl Acetate
Bromotrichloromethane	Ethyl benzene *
Butanal (Butylaldehyde)	Ethyl bromide
Butane	Ethylene
Butyl Ester, Acetic Acid (Butyl Acetate)	Ethylene Dibromide (EDB)
Camphene	Ethylene Oxide
Carbon Disulfide	Freon 11 (Trichlorofluoromethane)
Carbon tetrachloride	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)
Chlorobenzene	Freon 114 (1,2-Dichloro-1,1,2,2-tetrafluoroethane)
Chloroethane	Freon 12 (Difluorodichloromethane)
Chloroform	Freon 22 (Chlorodifluoromethane)
Chloromethane	Heptane
cis-1,2-Dichloroethylene	Hexachlorobutadiene
cis-1,2-Dimethylcyclohexane	Hexanal

VOC Species	VOC Species
Hexane *	Tetrachloroethene
Hexyl benzene	Tetrachloroethylene
Indane	Toluene *
Isobutane	trans-1,2-Dichloroethylene
Isobutyl Acetate	trans-1,2-Dimethylcyclohexane
Isobutyl Alcohol *	trans-1,3-Dichloropropene
iso-Butylbenzene	trans-1,4-Dimethyl cyclohexane
Isopentane	trans-2-Butene
Isoprene	trans-2-Heptene
Isopropyl Acetate	trans-2-Hexene
Isopropyl Alcohol *	trans-2-Octene
iso-Propylbenzene	trans-2-Pentene
m and p-Xylene *	trans-3-Heptene
Methanol *	trans-3-Methyl-2-pentene
Methyl Ester, Acetic Acid (Methyl Acetate)	trans-4-Methyl-2-pentene
Methyl Isobutyl Ketone (MIK, MIBK) *	Trichloroethylene *
Methylcyclohexane	Undecane
Methylcyclopentane	Vinylchloride
MTBE (Tert-butyl methyl ether)	
Naphthalene	
n-Butylbenzene	
Nonane	
n-Propylbenzene	
Octane	
o-Xylene *	
p-Cymene	
Pentanal (Valeraldehyde)	
Pentane	
Propane	
Propylene	
sec-Butylbenzene	
Styrene *	
tert-Butyl benzene	

*These substances were identified in Table A.1 as being released from NPRI facilities in Transcona, Kildonan, St. Boniface and East St. Paul.

Reference: Environment Canada Environmental Technology Centre. Determination of Volatile Organic Compounds (VOCs) in Ambient Air by Gas Chromatography /Mass Spectrometry (GC/MS). Method No: 1.02/2.4/M. May 11, 2006.

Appendix D. Analysis of Constituents in Particulate Matter

Table D.1. École Regent Park Analysis of Constituents in Particulate Matter*
July 20, 2003 to December 29, 2003

Number of samples: 57

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Al	0.0179	0.2416	1.0953	120	0.0015	0.0255	0.1644	120
Si	0.1235	0.9001	4.5539	5	0.0016	0.1246	0.6482	5
P	0.0016	0.0432	0.1849		0.0008	0.0210	0.1542	
S	0.0850	0.3358	1.4218		0.0748	0.2989	1.2739	
Cl	0.0023	0.0471	2.6997	10	0.0003	0.0082	0.6523	10
K	0.0254	0.1242	0.6202		0.0035	0.0582	0.3602	
Ca	0.0702	0.7067	3.8478		0.0034	0.0534	0.4361	
Sc	0.0043	0.0085	0.0185		0.0008	0.0045	0.0150	
Ti	0.0090	0.0233	0.0723	120	0.0047	0.0076	0.0227	120
V	0.0062	0.0094	0.0170	2	0.0032	0.0043	0.0114	2
Cr	0.0046	0.0062	0.0155	1.5	0.0014	0.0029	0.0084	1.5
Mn	0.0038	0.0199	0.0792	2.5	0.0019	0.0105	0.0514	2.5
Fe	0.0337	0.3051	1.6551	4	0.0083	0.0864	0.4576	4
Co	0.0014	0.0029	0.0054	0.1	0.0003	0.0015	0.0039	0.1
Ni	0.0014	0.0019	0.0060	2	0.0007	0.0010	0.0027	2
Cu	0.0034	0.0100	0.0402	50	0.0018	0.0044	0.0195	50
Zn	0.0013	0.0154	0.0540	120	0.0007	0.0074	0.0411	120
Ga	0.0011	0.0037	0.0113		0.0004	0.0017	0.0084	
Ge	0.0006	0.0011	0.0024		0.0001	0.0006	0.0019	
As	0.0001	0.0008	0.0021	0.3	0.0001	0.0004	0.0017	0.3
Se	0.0004	0.0008	0.0017	10	0.0001	0.0004	0.0011	10
Br	0.0002	0.0013	0.0103	20	0.0001	0.0009	0.0071	20
Rb	0.0003	0.0008	0.0018		0.0001	0.0003	0.0006	
Sr	0.0004	0.0014	0.0051	120	0.0001	0.0003	0.0007	120
Y	0.0001	0.0004	0.0009		0.0001	0.0002	0.0004	
Zr	0.0001	0.0006	0.0019		0.0001	0.0002	0.0005	
Nb	0.0001	0.0003	0.0009		0.0001	0.0001	0.0003	
Mo	0.0001	0.0006	0.0014	120	0.0001	0.0003	0.0008	120
Pd	0.0009	0.0010	0.0018	10	0.0004	0.0005	0.0012	10
Ag	0.0007	0.0010	0.0025	1	0.0004	0.0005	0.0017	1
Cd	0.0009	0.0012	0.0026	2	0.0005	0.0006	0.0018	2
In	0.0008	0.0012	0.0027		0.0003	0.0006	0.0015	
Sn	0.0012	0.0013	0.0023	10	0.0006	0.0007	0.0015	10
Sb	0.0013	0.0016	0.0044	25	0.0004	0.0008	0.0037	25
Te	0.0016	0.0018	0.0047	10	0.0008	0.0010	0.0039	10
I	0.0019	0.0023	0.0045		0.0007	0.0012	0.0034	
Cs	0.0027	0.0063	0.0121		0.0006	0.0033	0.0095	
Ba	0.0054	0.0131	0.0334	10	0.0016	0.0055	0.0130	10

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
La	0.0053	0.0101	0.0199		0.0029	0.0055	0.0119	
Pb	0.0013	0.0032	0.0092	2	0.0004	0.0020	0.0076	2
Na	0.0176	0.0487	1.1259		0.0116	0.0330	0.2134	
Mg	0.0026	0.0957	0.6066	120	0.0017	0.0065	0.0641	120
Ce	0.0077	0.0119	0.0200		0.0030	0.0071	0.0165	
Pr	0.0080	0.0157	0.0387		0.0023	0.0090	0.0232	
Nd	0.0078	0.0204	0.0444		0.0032	0.0116	0.0258	
W	0.0006	0.0060	0.0264		0.0001	0.0027	0.0191	
Hg	0.0002	0.0017	0.0034	2	0.0001	0.0007	0.0019	2

*To determine statistics, all zero values were replaced with one half of the detection limit for the respective metal.
** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table D.2. Bernie Wolfe School Analysis of Constituents in Particulate Matter*
January 1, 2004 to April 10, 2004

Number of samples: 55

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Al	0.0029	0.1312	0.5490	120	0.0015	0.0315	0.1869	120
Si	0.0823	0.4418	2.2005	5	0.0014	0.1001	0.3526	5
P	0.0114	0.0849	0.2289		0.0008	0.0439	0.2061	
S	0.1887	0.5230	2.7096		0.1768	0.4719	2.6250	
Cl	0.0262	0.1865	2.4682	10	0.0021	0.0509	1.9800	10
K	0.0249	0.0779	0.2834		0.0177	0.0475	0.2093	
Ca	0.0372	0.3235	4.7260		0.0031	0.0303	0.3077	
Sc	0.0034	0.0070	0.0134		0.0020	0.0038	0.0085	
Ti	0.0088	0.0171	0.0509	120	0.0046	0.0062	0.0148	120
V	0.0059	0.0082	0.0185	2	0.0032	0.0039	0.0140	2
Cr	0.0044	0.0067	0.0154	1.5	0.0022	0.0037	0.0132	1.5
Mn	0.0037	0.0103	0.0898	2.5	0.0019	0.0054	0.0635	2.5
Fe	0.0273	0.1469	0.9617	4	0.0018	0.0468	0.4813	4
Co	0.0013	0.0027	0.0050	0.1	0.0003	0.0015	0.0039	0.1
Ni	0.0012	0.0018	0.0044	2	0.0004	0.0010	0.0037	2
Cu	0.0035	0.0127	0.0373	50	0.0018	0.0064	0.0235	50
Zn	0.0013	0.0121	0.0936	120	0.0007	0.0088	0.0765	120
Ga	0.0015	0.0045	0.0155		0.0008	0.0025	0.0087	
Ge	0.0006	0.0011	0.0025		0.0001	0.0006	0.0020	
As	0.0002	0.0007	0.0018	0.3	0.0001	0.0004	0.0014	0.3
Se	0.0003	0.0008	0.0022	10	0.0001	0.0004	0.0016	10
Br	0.0011	0.0032	0.0149	20	0.0008	0.0029	0.0140	20
Rb	0.0002	0.0006	0.0017		0.0001	0.0003	0.0009	
Sr	0.0003	0.0011	0.0051	120	0.0002	0.0004	0.0013	120
Y	0.0001	0.0004	0.0007		0.0001	0.0002	0.0005	
Zr	0.0001	0.0010	0.0174		0.0001	0.0003	0.0018	
Nb	0.0001	0.0003	0.0007		0.0001	0.0002	0.0004	
Mo	0.0002	0.0005	0.0011	120	0.0001	0.0002	0.0008	120
Pd	0.0007	0.0010	0.0017	10	0.0003	0.0005	0.0011	10
Ag	0.0006	0.0010	0.0017	1	0.0002	0.0005	0.0012	1
Cd	0.0009	0.0012	0.0027	2	0.0005	0.0006	0.0022	2
In	0.0010	0.0011	0.0020		0.0005	0.0006	0.0015	
Sn	0.0012	0.0013	0.0024	10	0.0006	0.0007	0.0018	10
Sb	0.0010	0.0014	0.0030	25	0.0003	0.0007	0.0011	25
Te	0.0014	0.0017	0.0025	10	0.0006	0.0009	0.0011	10
I	0.0019	0.0024	0.0052		0.0011	0.0013	0.0039	
Cs	0.0019	0.0064	0.0154		0.0007	0.0033	0.0089	
Ba	0.0025	0.0097	0.0165	10	0.0006	0.0043	0.0101	10
La	0.0052	0.0101	0.0179		0.0022	0.0053	0.0127	
Pb	0.0011	0.0034	0.0110	2	0.0009	0.0024	0.0099	2

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Na	0.0125	0.0333	1.2337		0.0011	0.0150	1.1090	
Mg	0.0035	0.0417	0.7256	120	0.0018	0.0120	0.1387	120
Ce	0.0071	0.0111	0.0199		0.0020	0.0061	0.0127	
Pr	0.0059	0.0151	0.0294		0.0020	0.0079	0.0254	
Nd	0.0071	0.0182	0.0321		0.0040	0.0097	0.0230	
W	0.0022	0.0088	0.0329		0.0010	0.0050	0.0209	
Hg	0.0006	0.0019	0.0048	2	0.0001	0.0010	0.0036	2
Cl-	0.0680	0.2730	1.0775		0.0035	0.0539	0.4430	
Na^+	0.0070	0.1680	0.7594		0.0012	0.0355	0.2683	
NH4+	0.1613	0.5542	4.1443		0.1601	0.5463	4.0919	

*To determine statistics, all zero values were replaced with one half of the detection limit for the respective metal.
** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table D.3. Joseph Teres School Analysis of Constituents in Particulate Matter*
April 14, 2004 to July 15, 2004

Number of samples: 43

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Al	0.0030	0.1966	0.9415	120	0.0015	0.0272	0.1431	120
Si	0.0522	0.7794	3.5743	5	0.0015	0.0944	0.4631	5
P	0.0017	0.0336	0.1361		0.0008	0.0122	0.0957	
S	0.0410	0.2770	0.7115		0.0273	0.2529	0.6944	
Cl	0.0107	0.0621	0.1983	10	0.0019	0.0221	0.1006	10
K	0.0160	0.0885	0.3236		0.0030	0.0339	0.0954	
Ca	0.0320	0.7162	2.9235		0.0058	0.0647	0.3020	
Sc	0.0026	0.0075	0.0189		0.0002	0.0037	0.0137	
Ti	0.0089	0.0208	0.0593	120	0.0046	0.0073	0.0190	120
V	0.0062	0.0086	0.0172	2	0.0033	0.0044	0.0108	2
Cr	0.0046	0.0064	0.0148	1.5	0.0022	0.0033	0.0125	1.5
Mn	0.0037	0.0102	0.0756	2.5	0.0019	0.0041	0.0537	2.5
Fe	0.0357	0.1985	0.7984	4	0.0092	0.0538	0.2323	4
Co	0.0015	0.0028	0.0062	0.1	0.0005	0.0015	0.0034	0.1
Ni	0.0014	0.0020	0.0049	2	0.0008	0.0009	0.0031	2
Cu	0.0035	0.0095	0.0328	50	0.0018	0.0048	0.0227	50
Zn	0.0013	0.0103	0.1425	120	0.0007	0.0051	0.1166	120
Ga	0.0009	0.0032	0.0102		0.0002	0.0015	0.0087	
Ge	0.0006	0.0011	0.0020		0.0003	0.0006	0.0015	
As	0.0004	0.0008	0.0018	0.3	0.0001	0.0004	0.0014	0.3
Se	0.0003	0.0009	0.0023	10	0.0001	0.0005	0.0020	10
Br	0.0004	0.0016	0.0039	20	0.0002	0.0013	0.0036	20
Rb	0.0002	0.0008	0.0016		0.0001	0.0003	0.0011	
Sr	0.0005	0.0015	0.0067	120	0.0002	0.0005	0.0051	120
Y	0.0001	0.0005	0.0010		0.0001	0.0002	0.0009	
Zr	0.0002	0.0008	0.0027		0.0001	0.0003	0.0007	
Nb	0.0001	0.0004	0.0010		0.0001	0.0002	0.0006	
Mo	0.0002	0.0007	0.0014	120	0.0001	0.0003	0.0009	120
Pd	0.0008	0.0010	0.0020	10	0.0005	0.0005	0.0016	10
Ag	0.0008	0.0010	0.0021	1	0.0004	0.0005	0.0012	1
Cd	0.0009	0.0011	0.0026	2	0.0005	0.0005	0.0012	2
In	0.0008	0.0011	0.0021		0.0005	0.0006	0.0010	
Sn	0.0012	0.0013	0.0022	10	0.0006	0.0007	0.0016	10
Sb	0.0011	0.0015	0.0034	25	0.0005	0.0008	0.0027	25
Te	0.0015	0.0017	0.0033	10	0.0006	0.0009	0.0025	10
I	0.0017	0.0021	0.0032		0.0007	0.0011	0.0020	
Cs	0.0022	0.0055	0.0115		0.0008	0.0027	0.0073	
Ba	0.0034	0.0101	0.0355	10	0.0008	0.0045	0.0134	10
La	0.0045	0.0111	0.0217		0.0018	0.0053	0.0132	
Pb	0.0016	0.0036	0.0149	2	0.0008	0.0023	0.0134	2

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Na	0.0193		0.0236		0.0102		0.0121	
Mg	0.0035	0.0916	0.4426	120	0.0018	0.0096	0.0753	120
Ce	0.0061	0.0113	0.0190		0.0010	0.0062	0.0135	
Pr	0.0055	0.0168	0.0375		0.0023	0.0086	0.0275	
Nd	0.0075	0.0197	0.0392		0.0011	0.0090	0.0213	
W	0.0037	0.0129	0.0339		0.0002	0.0071	0.0192	
Hg	0.0008	0.0021	0.0039	2	0.0001	0.0010	0.0027	2
Cl-	0.0551	0.0846	0.1515		0.0035	0.0328	0.0845	
Na+	0.0022	0.0149	0.0554		0.0012	0.0044	0.0439	
NH4+	0.2291	0.4416	1.0454		0.2279	0.4389	1.0441	

*To determine statistics, all zero values were replaced with one half of the detection limit for the respective metal.

** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table D.4. École Margaret Underhill Analysis of Constituents in Particulate Matter*
July 19, 2004 to October 25, 2004
Number of samples: 55

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Al	0.0015	0.1217	0.9189	120	0.0007	0.0258	0.0871	120
Si	0.0223	0.6844	4.0721	5	0.0006	0.0901	0.3819	5
P	0.0009	0.0267	0.1096		0.0005	0.0089	0.0656	
S	0.0878	0.2620	1.0203		0.0558	0.2578	0.9652	
Cl	0.0027	0.0283	0.1464	10	0.0006	0.0422	0.0826	10
K	0.0185	0.1028	0.4835		0.0006	0.0513	0.3124	
Ca	0.0308	0.5635	3.1310		0.0026	0.0693	0.2809	
Sc	0.0027	0.0080	0.0271		0.0012	0.0035	0.0243	
Ti	0.0105	0.0264	0.0812	120	0.0051	0.0069	0.0659	120
V	0.0072	0.0150	0.0423	2	0.0036	0.0038	0.0384	2
Cr	0.0054	0.0125	0.0337	1.5	0.0027	0.0041	0.0175	1.5
Mn	0.0044	0.0164	0.0727	2.5	0.0021	0.0033	0.0445	2.5
Fe	0.0190	0.2058	0.8399	4	0.0029	0.0461	0.2720	4
Co	0.0014	0.0043	0.0137	0.1	0.0008	0.0015	0.0077	0.1
Ni	0.0014	0.0036	0.0114	2	0.0008	0.0008	0.0071	2
Cu	0.0038	0.0078	0.0227	50	0.0020	0.0058	0.0177	50
Zn	0.0017	0.0133	0.1457	120	0.0008	0.0065	0.1195	120
Ga	0.0012	0.0030	0.0107		0.0001	0.0017	0.0081	
Ge	0.0003	0.0011	0.0021		0.0001	0.0006	0.0015	
As	0.0002	0.0009	0.0035	0.3	0.0001	0.0005	0.0030	0.3
Se	0.0002	0.0009	0.0024	10	0.0001	0.0006	0.0020	10
Br	0.0001	0.0008	0.0027	20	0.0001	0.0011	0.0024	20
Rb	0.0002	0.0008	0.0021		0.0001	0.0003	0.0010	
Sr	0.0003	0.0014	0.0152	120	0.0001	0.0005	0.0140	120
Y	0.0002	0.0006	0.0015		0.0001	0.0004	0.0010	
Zr	0.0001	0.0008	0.0032		0.0001	0.0003	0.0010	
Nb	0.0001	0.0005	0.0011		0.0001	0.0002	0.0008	
Mo	0.0002	0.0008	0.0017	120	0.0001	0.0006	0.0012	120
Pd	0.0009	0.0011	0.0021	10	0.0005	0.0005	0.0017	10
Ag	0.0009	0.0011	0.0021	1	0.0005	0.0005	0.0016	1
Cd	0.0009	0.0013	0.0037	2	0.0005	0.0005	0.0022	2
In	0.0010	0.0015	0.0035		0.0005	0.0006	0.0024	
Sn	0.0012	0.0016	0.0040	10	0.0006	0.0007	0.0025	10
Sb	0.0013	0.0020	0.0137	25	0.0007	0.0007	0.0127	25
Te	0.0016	0.0020	0.0055	10	0.0008	0.0009	0.0047	10
I	0.0019	0.0026	0.0068		0.0010	0.0012	0.0059	
Cs	0.0021	0.0051	0.0110		0.0011	0.0031	0.0096	
Ba	0.0034	0.0099	0.0776	10	0.0010	0.0046	0.0760	10
La	0.0035	0.0086	0.0190		0.0005	0.0067	0.0098	
Pb	0.0005	0.0034	0.0182	2	0.0002	0.0017	0.0168	2

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Na	0.0140	0.0195	0.1812		0.0071		0.0412	
Mg	0.0061	0.0931	0.6629	120	0.0006	0.0063	0.0860	120
Ce	0.0043	0.0093	0.0197		0.0020	0.0053	0.0150	
Pr	0.0027	0.0128	0.0327		0.0001	0.0060	0.0207	
Nd	0.0059	0.0191	0.0363		0.0009	0.0083	0.0248	
W	0.0014	0.0063	0.0220		0.0001	0.0037	0.0142	
Hg	0.0004	0.0021	0.0051	2	0.0001	0.0009	0.0034	2

*To determine statistics, all zero values were replaced with one half of the detection limit for the respective metal.
** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table D.5. Phase 1 Analysis of Constituents in Particulate Matter*
July 20, 2003 to October 25, 2004

Number of samples: 210

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Al	0.0015	0.1649	1.0953	120	0.0007	0.0201	0.1869	120
Si	0.0223	0.6751	4.5539	5	0.0006	0.0901	0.6482	5
P	0.0009	0.0432	0.2289		0.0005	0.0175	0.2061	
S	0.0410	0.3397	2.7096		0.0273	0.3025	2.6250	
Cl	0.0023	0.0625	2.6997	10	0.0003	0.0145	1.9800	10
K	0.0160	0.0976	0.6202		0.0006	0.0421	0.3602	
Ca	0.0308	0.5442	4.7260		0.0026	0.0444	0.4361	
Sc	0.0026	0.0078	0.0271		0.0002	0.0041	0.0243	
Ti	0.0088	0.0217	0.0812	120	0.0046	0.0077	0.0659	120
V	0.0059	0.0101	0.0423	2	0.0032	0.0048	0.0384	2
Cr	0.0044	0.0077	0.0337	1.5	0.0014	0.0039	0.0175	1.5
Mn	0.0037	0.0139	0.0898	2.5	0.0019	0.0065	0.0635	2.5
Fe	0.0190	0.2081	1.6551	4	0.0018	0.0578	0.4813	4
Co	0.0013	0.0032	0.0137	0.1	0.0003	0.0016	0.0077	0.1
Ni	0.0012	0.0023	0.0114	2	0.0004	0.0012	0.0071	2
Cu	0.0034	0.0099	0.0402	50	0.0018	0.0047	0.0235	50
Zn	0.0013	0.0128	0.1457	120	0.0007	0.0072	0.1195	120
Ga	0.0009	0.0036	0.0155		0.0001	0.0018	0.0087	
Ge	0.0003	0.0011	0.0025		0.0001	0.0005	0.0020	
As	0.0001	0.0008	0.0035	0.3	0.0001	0.0004	0.0030	0.3
Se	0.0002	0.0008	0.0024	10	0.0001	0.0004	0.0020	10
Br	0.0001	0.0015	0.0149	20	0.0001	0.0011	0.0140	20
Rb	0.0002	0.0007	0.0021		0.0001	0.0003	0.0011	
Sr	0.0003	0.0014	0.0152	120	0.0001	0.0004	0.0140	120
Y	0.0001	0.0004	0.0015		0.0001	0.0002	0.0010	
Zr	0.0001	0.0008	0.0174		0.0001	0.0002	0.0018	
Nb	0.0001	0.0004	0.0011		0.0001	0.0002	0.0008	
Mo	0.0001	0.0006	0.0017	120	0.0001	0.0003	0.0012	120
Pd	0.0007	0.0010	0.0021	10	0.0003	0.0005	0.0017	10
Ag	0.0006	0.0011	0.0025	1	0.0002	0.0005	0.0017	1
Cd	0.0009	0.0012	0.0037	2	0.0005	0.0006	0.0022	2
In	0.0008	0.0012	0.0035		0.0003	0.0006	0.0024	
Sn	0.0012	0.0014	0.0040	10	0.0006	0.0007	0.0025	10
Sb	0.0010	0.0016	0.0137	25	0.0003	0.0008	0.0127	25
Te	0.0014	0.0018	0.0055	10	0.0006	0.0009	0.0047	10
I	0.0017	0.0024	0.0068		0.0007	0.0012	0.0059	
Cs	0.0019	0.0058	0.0154		0.0006	0.0030	0.0096	
Ba	0.0025	0.0107	0.0776	10	0.0006	0.0047	0.0760	10
La	0.0035	0.0099	0.0217		0.0005	0.0051	0.0132	
Pb	0.0005	0.0034	0.0182	2	0.0002	0.0022	0.0168	2

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Na	0.0125	0.0293	1.2337		0.0011	0.0153	1.1090	
Mg	0.0026	0.0758	0.7256	120	0.0006	0.0081	0.1387	120
Ce	0.0043	0.0109	0.0200		0.0010	0.0061	0.0165	
Pr	0.0027	0.0149	0.0387		0.0001	0.0078	0.0275	
Nd	0.0059	0.0193	0.0444		0.0009	0.0098	0.0258	
W	0.0006	0.0079	0.0339		0.0001	0.0041	0.0209	
Hg	0.0002	0.0019	0.0051	2	0.0001	0.0009	0.0036	2
Cl-	0.0551	0.1617	1.0775		0.0035	0.0431	0.4430	
Na^+	0.0022	0.0569	0.7594		0.0012	0.0140	0.2683	
$NH4^+$	0.1613	0.5007	4.1443		0.1601	0.4954	4.0919	

*To determine statistics, all zero values were replaced with one half of the detection limit for the respective metal.

** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table D.6. Phase II Analysis of Constituents in Particulate Matter*
November 15, 2004 to March 8, 2005
Number of samples: 52

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Al	0.0015	0.0577	0.5543	120	0.0008	0.0084	0.0576	120
Si	0.0167	0.2958	2.2756	5	0.0005	0.0411	0.2108	5
P	0.0010	0.0306	0.0955		0.0005	0.0262	0.0881	
S	0.1790	0.4416	1.2056		0.1684	0.4031	1.1495	
Cl	0.0030	0.1976	5.2616	10	0.0015	0.0345	0.7754	10
K	0.0268	0.0823	0.5855		0.0032	0.0510	0.4377	
Ca	0.0372	0.3213	4.0201		0.0031	0.0400	0.2750	
Sc	0.0043	0.0094	0.0355		0.0001	0.0038	0.0255	
Ti	0.0144	0.0283	0.1313	120	0.0081	0.0110	0.0424	120
V	0.0096	0.0145	0.0392	2	0.0059	0.0074	0.0224	2
Cr	0.0068	0.0104	0.0295	1.5	0.0034	0.0055	0.0160	1.5
Mn	0.0053	0.0121	0.0485	2.5	0.0018	0.0062	0.0415	2.5
Fe	0.0202	0.1820	0.7685	4	0.0063	0.0595	0.2500	4
Co	0.0023	0.0043	0.0122	0.1	0.0004	0.0021	0.0081	0.1
Ni	0.0025	0.0035	0.0113	2	0.0016	0.0019	0.0051	2
Cu	0.0038	0.0076	0.0289	50	0.0022	0.0043	0.0268	50
Zn	0.0020	0.0135	0.0456	120	0.0010	0.0077	0.0274	120
Ga	0.0012	0.0028	0.0075		0.0001	0.0013	0.0062	
Ge	0.0001	0.0011	0.0020		0.0001	0.0005	0.0007	
As	0.0003	0.0009	0.0027	0.3	0.0001	0.0005	0.0023	0.3
Se	0.0001	0.0007	0.0017	10	0.0001	0.0003	0.0012	10
Br	0.0002	0.0011	0.0044	20	0.0001	0.0007	0.0040	20
Rb	0.0002	0.0006	0.0017		0.0001	0.0003	0.0015	
Sr	0.0002	0.0010	0.0040	120	0.0001	0.0004	0.0023	120
Y	0.0001	0.0005	0.0011		0.0001	0.0002	0.0006	
Zr	0.0001	0.0007	0.0038		0.0001	0.0003	0.0009	
Nb	0.0001	0.0004	0.0013		0.0001	0.0002	0.0008	
Mo	0.0001	0.0007	0.0016	120	0.0001	0.0004	0.0010	120
Pd	0.0009	0.0012	0.0023	10	0.0005	0.0006	0.0018	10
Ag	0.0007	0.0012	0.0034	1	0.0003	0.0005	0.0011	1
Cd	0.0009	0.0015	0.0043	2	0.0004	0.0007	0.0022	2
In	0.0010	0.0015	0.0066		0.0005	0.0007	0.0023	
Sn	0.0012	0.0018	0.0061	10	0.0006	0.0010	0.0037	10
Sb	0.0012	0.0020	0.0068	25	0.0005	0.0009	0.0029	25
Te	0.0015	0.0023	0.0052	10	0.0008	0.0011	0.0043	10
I	0.0019	0.0026	0.0070		0.0010	0.0013	0.0051	
Cs	0.0018	0.0050	0.0094		0.0010	0.0026	0.0063	
Ba	0.0024	0.0120	0.0428	10	0.0013	0.0043	0.0120	10
La	0.0026	0.0078	0.0146		0.0014	0.0044	0.0091	
Pb	0.0003	0.0022	0.0149	2	0.0002	0.0014	0.0114	2

Parameter	Transcona PM_{10} Concentration ($\mu g/m^3$)				Transcona $PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)	Minimum	Geometric Mean	Maximum	Ambient Air Quality Criteria ($\mu g/m^3$)**
Na	0.0148	0.2386	7.1024		0.0080	0.0826	1.5994	
Mg	0.0053	0.0662	0.9060	120	0.0004	0.0152	0.0899	120
Ce	0.0032	0.0089	0.0175		0.0015	0.0046	0.0109	
Pr	0.0028	0.0111	0.0209		0.0001	0.0053	0.0183	
Nd	0.0057	0.0190	0.0517		0.0029	0.0107	0.0319	
W	0.0007	0.0045	0.0137		0.0001	0.0024	0.0072	
Hg	0.0003	0.0015	0.0038	2	0.0001	0.0008	0.0025	2

*To determine statistics, all zero values were replaced with one half of the detection limit for the respective metal.
** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table D.7. Summary of Winnipeg Data – Constituents in Particulate Matter*
January 3, 2003 to January 4, 2005

Constituent	Symbol	$PM_{2.5}$ Fraction			PM_{10} Fraction		
		No. of Samples	Minimum	Maximum	No. of Samples	Minimum	Maximum
Aluminum	Al	115	0.0015	0.2108	115	0.0029	1.1398
Silicon	Si	115	0.0010	0.6728	115	0.0028	4.2755
Phosphorus	P	114	0.0005	0.1545	114	0.0008	0.1822
Sulphur	S	115	0.0060	2.0644	115	0.0199	2.2552
Chloride	Cl	115	0.0014	0.5782	115	0.0028	2.1881
Potassium	K	115	0.0027	0.7659	115	0.0058	0.9135
Calcium	Ca	115	0.0010	0.7795	115	0.0061	4.8969
Scandium	Sc	115	0.0002	0.0174	115	0.0002	0.0219
Titanium	Ti	115	0.0044	0.0371	115	0.0069	0.0918
Vanadium	V	115	0.0019	0.0330	115	0.0028	0.0330
Chromium	Cr	115	0.0014	0.0175	115	0.0017	0.0281
Manganese	Mn	115	0.0011	0.0224	115	0.0017	0.0418
Iron	Fe	115	0.0019	0.2575	115	0.0038	0.9324
Cobalt	Co	115	0.0001	0.0060	115	0.0001	0.0083
Nickel	Ni	115	0.0004	0.0073	115	0.0003	0.0094
Copper	Cu	115	0.0014	0.0324	115	0.0016	0.0462
Zinc	Zn	115	0.0006	0.0573	115	0.0012	0.0629
Gallium	Ga	115	0.0001	0.0100	115	0.0001	0.0153
Germanium	Ge	115	0.0001	0.0022	115	0.0001	0.0023
Arsenic	As	115	0.0001	0.0019	115	0.0000	0.0019
Selenium	Se	115	0.0001	0.0030	115	0.0000	0.0030
Bromine	Br	115	0.0001	0.0071	115	0.0001	0.0071
Rubidium	Rb	115	0.0001	0.0019	115	0.0001	0.0033
Strontium	Sr	115	0.0001	0.0021	115	0.0003	0.0066
Yttrium	Y	115	0.0001	0.0012	115	0.0001	0.0014
Zirconium	Zr	115	0.0001	0.0021	115	0.0001	0.0046
Niobium	Nb	115	0.0001	0.0010	115	0.0000	0.0014
Molybdenum	Mo	115	0.0001	0.0012	115	0.0002	0.0016
Palladium	Pd	115	0.0003	0.0017	115	0.0004	0.0022
Silver	Ag	115	0.0002	0.0014	115	0.0003	0.0018
Cadmium	Cd	115	0.0003	0.0046	115	0.0005	0.0055
Indium	In	115	0.0003	0.0025	115	0.0004	0.0025
Tin	Sn	115	0.0004	0.0029	115	0.0004	0.0038
Antimony	Sb	115	0.0004	0.0064	115	0.0006	0.0080
Tellurium	Te	115	0.0005	0.0036	115	0.0006	0.0093
Iodine	I	115	0.0006	0.0054	115	0.0009	0.0055
Cesium	Cs	115	0.0002	0.0076	115	0.0009	0.0111
Barium	Ba	115	0.0004	0.0154	115	0.0052	0.0371
Lanthanum	La	115	0.0011	0.0143	115	0.0021	0.0190
Lead	Pb	115	0.0001	0.0147	115	0.0003	0.0203
Sodium	Na	115	0.0073	0.4202	115	0.0131	1.7623
Magnesium	Mg	115	0.0009	0.1100	115	0.0025	0.6766
Cerium	Ce	115	0.0015	0.0123	115	0.0031	0.0195
Praseodymium	Pr	115	0.0018	0.0223	115	0.0025	0.0422

Constituent	Symbol	$PM_{2.5}$ Fraction			PM_{10} Fraction		
		No. of Samples	Minimum	Maximum	No. of Samples	Minimum	Maximum
Neodymium	Nd	115	0.0006	0.0326	115	0.0029	0.0470
Tantalum	Ta						
Tungsten	W	115	0.0001	0.0192	115	0.0001	0.0319
Mercury	Hg	115	0.0001	0.0064	115	0.0002	0.0074
Tellurium	Tl						
Bismuth	Bi						
Chlorine ion	Cl-	84	0.0031	0.4417	84	0.0172	1.8912
Sodium ion	Na+	84	0.0012	0.3420	84	0.0022	1.5954
Ammonium	NH4+	84	0.0014	2.0822	84	0.0027	2.0922

* All zero values were replaced with one half of the detection limit for the respective metal.

Time period: January 3, 2003 to January 4, 2005

Appendix E. Analysis of Volatile Organic Compounds (VOCs)

Table E.1. École Regent Park VOC Analysis

July 20, 2003 to December 29, 2003

Number of samples: 67

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Nonpolar Volatile Organic Compounds				
1,1,1-Trichloroethane	0.132	0.1515	0.186	115,000
1,1,2,2-Tetrachloroethane	0	6E-05	0.004	
1,1,2-Trichloroethane	0	6E-05	0.004	
1,1-Dichloroethane	0	0	0	200
1,1-Dichloroethylene	0	0	0	10
1,2,3-Trimethylbenzene	0.008	0.2537	2.84	
1,2,4-Trichlorobenzene	0	0.0092	0.022	400
1,2,4-Trimethylbenzene	0.032	1.6612	16.996	1,000
1,2-Dichlorobenzene	0	0.0033	0.008	30,500
1,2-Dichloroethane	0.018	0.0319	0.046	2
1,2-Dichloropropane	0	0.0069	0.018	2,400
1,2-Diethylbenzene	0	0.007	0.046	
1,3,5-Trimethylbenzene	0.01	0.4992	5.152	
1,3-Butadiene	0.018	0.1038	0.302	
1,3-Dichlorobenzene	0	0.0026	0.008	
1,3-Diethylbenzene	0.002	0.0442	0.394	
1,4-Dichlorobenzene	0.032	0.2586	1.302	95
1,4-Dichlorobutane	0	0.0011	0.076	
1,4-Diethylbenzene	0	0.0773	0.882	
1-Butene/Isobutene	0.078	0.3467	1.286	
1-Butyne	0	0.0044	0.014	
1-Decene	0	0.0014	0.064	60,000
1-Heptene	0	0	0	
1-Hexene	0	0.0435	0.178	
1-Methylcyclohexene	0	0.0071	0.018	
1-Methylcyclopentene	0	0.0228	0.084	
1-Nonene	0	0.0257	0.334	
1-Octene	0	0.0087	0.118	50,000
1-Pentene	0	0.106	0.456	
1-Propyne	0.016	0.0685	0.182	
1-Undecene	0	0.0022	0.15	
2,2,3-Trimethylbutane	0	0.0045	0.018	
2,2,4-Trimethylpentane	0	0.2678	1.014	
2,2,5-Trimethylhexane	0	0.0112	0.048	
2,2-Dimethylbutane	0.014	0.0946	0.382	
2,2-Dimethylhexane	0	0	0	
2,2-Dimethylpentane	0.004	0.02	0.094	
2,2-Dimethylpropane	0	0.0136	0.118	
2,3,4-Trimethylpentane	0.02	0.0775	0.274	
2,3-Dimethylbutane	0.028	0.1519	0.572	
2,3-Dimethylpentane	0.062	0.2996	0.82	
2,4-Dimethylhexane	0	0.0527	0.168	
2,4-Dimethylpentane	0	0.1198	0.444	
2,5-Dimethylheptane	No Data	No Data	No Data	
2,5-Dimethylhexane	0	0.0399	0.11	
2-Ethyl-1-Butene	0	0	0	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
2-Ethyltoluene	0.01	0.4068	4.424	
2-Methyl-1-butene	0.022	0.1545	0.974	
2-Methyl-1-Pentene	No Data	No Data	No Data	
2-Methyl-2-butene	0.022	0.1616	1.182	
2-methyl-2-Pentene	No Data	No Data	No Data	
2-Methylheptane	0.014	0.137	0.464	
2-Methylhexane	0.06	0.324	1.706	
2-Methylpentane	0.07	0.5616	2.372	
3,6-Dimethyloctane	0	0	0	
3-Ethyltoluene	0.02	0.9348	9.56	
3-Methyl-1-butene	0.008	0.0398	0.25	
3-Methyl-1-pentene	0	0.0069	0.032	
3-Methylheptane	0	0.1135	0.396	
3-Methylhexane	0.056	0.3196	2.206	
3-Methyloctane	No Data	No Data	No Data	
3-Methylpentane	0.058	0.4433	1.378	
4-Ethyltoluene	0.008	0.4713	5.1	
4-Methyl-1-pentene	0	0.0057	0.034	
4-Methylheptane	0.006	0.0474	0.146	
4-Methyloctane	No Data	No Data	No Data	
Acetylene	0.46645	1.2859	5.292	56,000
a-Pinene	No Data	No Data	No Data	
Benzene	0.27	0.7808	1.848	
Benzylchloride	0	0.0008	0.006	
b-Pinene	No Data	No Data	No Data	
Bromochloromethane	0	0.0002	0.008	
Bromodichloromethane	No Data	No Data	No Data	
Bromoform	0.008	0.0183	0.034	55
Bromomethane	0.048	0.0564	0.112	1,350
Bromotrichloromethane	0	0	0	
Butane	0.752	3.6782	37.6	
Camphene	No Data	No Data	No Data	
Carbon tetrachloride	0.56	0.6134	0.676	2.4
Chlorobenzene	0	0.003	0.036	
Chloroethane	0.008	0.0213	0.154	
Chloroform	0.07	0.1027	0.346	1
Chloromethane	0.94	1.0546	1.23	7,000
cis-1,2-Dichloroethylene	0	0.0001	0.004	105
cis-1,2-Dimethylcyclohexane	0	0.0309	0.16	
cis-1,3-Dichloropropene	0	0	0	
cis-1,3-Dimethylcyclohexane	0.006	0.1503	0.608	
cis-1,4/t-1,3-Dimethylcyclohexane	0.002	0.0485	0.234	
cis-2-Butene	0.014	0.1056	1.016	
cis-2-Heptene	0	0.0047	0.098	
cis-2-Hexene	0	0.015	0.054	
cis-2-Octene	No Data	No Data	No Data	
cis-2-Pentene	0.01	0.0692	0.404	
cis-3-Heptene	0	0.0074	0.246	
cis-3-Methyl-2-pentene	0.006	0.0339	0.112	
cis-4-Methyl-2-pentene	0	0.0177	0.074	
Cyclohexane	0	0.0974	1.024	100,000
Cyclohexene	0	0.001	0.022	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Cyclopentane	0.018	0.1346	0.498	
Cyclopentene	0.002	0.0212	0.088	
Decane	0.016	0.1819	1.218	60,000
Dibromochloromethane	0	0.0029	0.004	
Dibromomethane	0.022	0.0279	0.032	
Dichloromethane	0.162	0.3743	1.43	220
d-Limonene	No Data	No Data	No Data	
Dodecane	0.008	0.0531	0.43	
EDB	0	3E-05	0.002	3
Ethane	1.51793	3.0243	6.4419	
Ethylbenzene	0.052	0.7626	3.956	1,000
Ethylbromide	0	0.0001	0.004	
Ethylene	0.55635	1.9563	4.566	40
Freon11	1.618	1.7329	2.304	6,000
Freon113	0.55	0.6036	0.676	800,000
Freon114	0.1	0.1088	0.12	700,000
Freon12	2.446	2.6587	2.99	500,000
Freon22	0.538	0.8628	6.508	350,000
Heptane	0.036	0.2467	1.59	11,000
Hexachlorobutadiene	0	0.0003	0.002	
Hexane	0.064	0.5221	1.994	12,000
Hexylbenzene	0	0.0031	0.022	
Indane	0.004	0.0749	0.648	
Isobutane	0.33	1.9864	21.83	
iso-Butylbenzene	0	0.0184	0.21	
Isopentane	0.478	2.7061	22.064	
Isoprene	0.008	0.3379	6.534	
iso-Propylbenzene	0.004	0.0611	0.604	400
m and p-Xylene	0.118	3.1341	16.44	2,300
Methylcyclohexane	0.02	0.2524	2.214	
Methylcyclopentane	0.038	0.2835	0.858	
MTBE	No Data	No Data	No Data	
Naphthalene	0.008	0.116	0.372	22.5
n-Butylbenzene	0	0.0258	0.19	
Nonane	0.014	0.2211	3.438	
n-Propylbenzene	0.008	0.2786	3.12	
Octane	0	0.2773	1.266	15,300
o-Xylene	0.042	0.8256	4.688	2,300
p-Cymene	0.004	0.0248	0.15	
Pentane	0.186	1.1165	5	
Propane	0.648	2.5859	7.718	
Propylene	0.108	0.5554	1.568	
sec-Butylbenzene	0	0.0212	0.234	
Styrene	0.008	0.1371	0.442	400
tert-Butylbenzene	0	0.0006	0.038	
Tetrachloroethene	No Data	No Data	No Data	
Tetrachloroethylene	0.03	0.0786	0.35	360
Toluene	0.272	3.1118	9.072	2,000
trans-1,2-Dichloroethylene	0	0	0	105
trans-1,2-Dimethylcyclohexane	0	0.0003	0.014	
trans-1,3-Dichloropropene	0	0	0	
trans-1,4-Dimethylcyclohexane	0.002	0.0541	0.202	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
trans-2-Butene	0.012	0.1093	1.108	
trans-2-Heptene	0	0.0086	0.026	
trans-2-Hexene	0	0.0288	0.09	
trans-2-Octene	0	0.1195	0.562	
trans-2-Pentene	0.016	0.1276	0.774	
trans-3-Heptene	0	0.0075	0.024	
trans-3-Methyl-2-pentene	0	0.0127	0.07	
trans-4-Methyl-2-pentene	0	6E-05	0.004	
Trichloroethylene	0	0.1132	0.616	115
Undecane	0.024	0.1763	1.494	
Vinylchloride	0	0.0026	0.066	1
Polar Volatile Organic Compounds				
1-Butanol	0	0.029	0.678	770
1-Propanol (Propyl alcohol)	0	0.2408	7.04	16,000
2-Butanol	0	0	0	
2-Butanone (MEK)	0.192	1.1887	3.856	1,000
2-Butenal (E) (Crotonaldehyde)	0	0.1494	7.64	
2-Ethoxy-2-Methyl-Propane (ETBE)	No Data	No Data	No Data	
2-Methoxy-2-Methyl-Propane (MTBE)	No Data	No Data	No Data	
2-Methyl-2-Propenal (MAC)	0	0.0749	0.954	
2-Methyl Furan	0	0	0	
2-Methyl Propanal (Isobutyraldehyde)	0	0.1577	0.468	
2-Pentanone	0	0.0249	0.348	
2-Propenal (Acrolein)	0	1.3238	34.254	23.3
2-Propene Nitrile (Acrylonitrile)	0	0.0009	0.062	0.6
3-Buten-2-one (Methyl Vinyl Ketone, MVK)	0	0.5737	26.906	
3-Methyl Butanal (Isovaleraldehyde)	0	0.0123	0.192	
Acetaldehyde	1.308	4.2842	28.476	500
Acetone	0.512	2.4553	16.42	48,000
Acetonitrile	No Data	No Data	No Data	
Benzaldehyde	0	0.1671	0.672	
Butanal (Butylaldehyde)	0	1.3367	22.856	
Butyl Ester, Acetic Acid (Butyl Acetate)	0	1.1402	6.546	248
Carbon Disulfide	0	0.2159	1.972	330
Cyclohexanone	0	0	0	
Cyclopentanone	0	0.0005	0.034	
Ethanol	0.798	9.7651	57.016	19,000
Ethyl Acetate	0	1.017	5.424	19,000
Ethylene Oxide	0	0.0924	0.826	5
Hexanal	0	0.8387	11.696	
Isobutyl Acetate	No Data	No Data	No Data	412
Isobutyl Alcohol	No Data	No Data	No Data	
Isopropyl Acetate	0	0.0071	0.152	500
Isopropyl Alcohol	0	0.0952	0.924	24,000
Methanol	1.766	12.431	45.476	4,000
Methyl Ester, Acetic Acid (Methyl Acetate)	0	0.0076	0.152	412
Methyl Isobutyl Ketone (MIK, MIBK)	0	0.2241	2.77	1,200
Pentanal (Valeraldehyde)	0	0.3825	7.928	

* 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table E.2. Bernie Wolfe School VOC Analysis
January 1, 2004 to April 10, 2004
Number of samples: 58

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Nonpolar Volatile Organic Compounds				
1,1,1-Trichloroethane	0.1258	0.1407	0.166	115,000
1,1,2,2-Tetrachloroethane	0	0	0	
1,1,2-Trichloroethane	0	0	0	
1,1-Dichloroethane	0	0.0002	0.0064	200
1,1-Dichloroethylene	0	0	0	10
1,2,3-Trimethylbenzene	0	0.0467	0.134	
1,2,4-Trichlorobenzene	0	0.0092	0.024	400
1,2,4-Trimethylbenzene	0.002	0.2308	0.764	1,000
1,2-Dichlorobenzene	0	0.0033	0.008	30,500
1,2-Dichloroethane	0.034	0.0431	0.0985	2
1,2-Dichloropropane	0.008	0.012	0.0164	2,400
1,2-Diethylbenzene	0	0.0031	0.008	
1,3,5-Trimethylbenzene	0	0.0747	0.232	
1,3-Butadiene	0.0286	0.0888	0.39	
1,3-Dichlorobenzene	0	0.0032	0.008	
1,3-Diethylbenzene	0	0.0126	0.038	
1,4-Dichlorobenzene	0.008	0.0226	0.058	95
1,4-Dichlorobutane	0	0	0	
1,4-Diethylbenzene	0	0.036	0.138	
1-Butene/Isobutene	0.096	0.3018	1.016	
1-Butyne	0	0.0032	0.016	
1-Decene	0	0.0024	0.062	60,000
1-Heptene	0	0.0034	0.1424	
1-Hexene	0	0.0441	0.1777	
1-Methylcyclohexene	0	0.0058	0.026	
1-Methylcyclopentene	0	0.0148	0.062	
1-Nonene	0	0.0303	0.536	
1-Octene	0	0.0153	0.14	50,000
1-Pentene	0	0.0754	0.272	
1-Propyne	0.0125	0.0599	0.202	
1-Undecene	0	0.0009	0.028	
2,2,3-Trimethylbutane	0	0.0038	0.014	
2,2,4-Trimethylpentane	0	0.229	1.754	
2,2,5-Trimethylhexane	0	0.0092	0.052	
2,2-Dimethylbutane	0.0194	0.0874	0.2528	
2,2-Dimethylhexane	0	0.0002	0.0112	
2,2-Dimethylpentane	0	0.0148	0.046	
2,2-Dimethylpropane	0	0.016	0.042	
2,3,4-Trimethylpentane	0.0124	0.0619	0.384	
2,3-Dimethylbutane	0.0216	0.1097	0.466	
2,3-Dimethylpentane	0.0569	0.2515	1.62	
2,4-Dimethylhexane	0	0.0495	0.206	
2,4-Dimethylpentane	0	0.0906	0.49	
2,5-Dimethylheptane	No Data	No Data	No Data	
2,5-Dimethylhexane	0	0.0369	0.144	
2-Ethyl-1-Butene	0	0.0016	0.0355	
2-Ethyltoluene	0	0.0633	0.234	
2-Methyl-1-butene	0.02	0.1054	0.528	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
2-Methyl-1-Pentene	No Data	No Data	No Data	
2-Methyl-2-butene	0.004	0.1059	0.472	
2-methyl-2-Pentene	No Data	No Data	No Data	
2-Methylheptane	0.0181	0.0968	0.378	
2-Methylhexane	0.041	0.3042	1.578	
2-Methylpentane	0.0693	0.4233	1.67	
3,6-Dimethyloctane	0	0.0009	0.0239	
3-Ethyltoluene	0.002	0.1498	0.582	
3-Methyl-1-butene	0.006	0.0245	0.08	
3-Methyl-1-pentene	0	0.007	0.0235	
3-Methylheptane	0	0.0861	0.402	
3-Methylhexane	0	0.3234	1.696	
3-Methyloctane	No Data	No Data	No Data	
3-Methylpentane	0.074	0.3341	1.418	
4-Ethyltoluene	0.002	0.076	0.296	
4-Methyl-1-pentene	0	0.0063	0.0989	
4-Methylheptane	0	0.0374	0.154	
4-Methyloctane	No Data	No Data	No Data	
Acetylene	0.47339	1.171	3.69216	56,000
a-Pinene	0	0.0369	0.8668	
Benzene	0.3855	0.8854	2.81	
Benzylchloride	0	0.0012	0.008	
b-Pinene	0	0.0081	0.3293	
Bromochloromethane	No Data	No Data	No Data	
Bromodichloromethane	0	0	0	
Bromoform	0.0104	0.0198	0.044	55
Bromomethane	0.05	0.0569	0.07	1,350
Bromotrichloromethane	0	0	0	
Butane	0.6497	3.37	12.45	
Camphene	0	0.0072	0.082	
Carbon tetrachloride	0.456	0.6224	0.762	2.4
Chlorobenzene	0	0.0116	0.02	
Chloroethane	0.012	0.0241	0.056	
Chloroform	0.06	0.0896	0.152	1
Chloromethane	1.08	1.2186	1.3941	7,000
cis-1,2-Dichloroethylene	0	2E-05	0.0012	105
cis-1,2-Dimethylcyclohexane	0	0.0073	0.032	
cis-1,3-Dichloropropene	0	0	0	
cis-1,3-Dimethylcyclohexane	0	0.0371	0.126	
cis-1,4/t-1,3-Dimethylcyclohexane	0	0.0157	0.056	
cis-2-Butene	0.0148	0.0792	0.324	
cis-2-Heptene	0	0.0011	0.022	
cis-2-Hexene	0	0.0108	0.05	
cis-2-Octene	No Data	No Data	No Data	
cis-2-Pentene	0.0091	0.048	0.196	
cis-3-Heptene	0	0.0067	0.0693	
cis-3-Methyl-2-pentene	0	0.0227	0.108	
cis-4-Methyl-2-pentene	0	0.015	0.07	
Cyclohexane	0.0133	0.0899	0.848	100,000
Cyclohexene	0	0.0007	0.0144	
Cyclopentane	0.0152	0.0942	0.554	
Cyclopentene	0.004	0.0147	0.056	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Decane	0.002	0.1033	0.288	60,000
Dibromochloromethane	0	0.0019	0.004	
Dibromomethane	0.022	0.0259	0.03	
Dichloromethane	0.1662	0.49	3.012	220
d-Limonene	0	0.0296	0.168	
Dodecane	0	0.0272	0.094	
EDB	0	0.0001	0.002	3
Ethane	0.97607	3.9642	16.01506	
Ethylbenzene	0.024	0.5326	2.486	1,000
Ethylbromide	0	0.0004	0.0061	
Ethylene	0.53219	1.6624	6.76766	40
Freon11	1.408	1.6793	2.062	6,000
Freon113	0.548	0.5928	0.676	800,000
Freon114	0.1	0.1095	0.134	700,000
Freon12	2.4	2.6795	3.05	500,000
Freon22	0.526	0.6521	1.172	350,000
Heptane	0.0505	0.2856	1.15	11,000
Hexachlorobutadiene	0	0.0006	0.004	
Hexane	0.078	0.3815	1.394	12,000
Hexylbenzene	0	0.0145	0.096	
Indane	0	0.0253	0.068	
Isobutane	0.3632	1.933	7.7439	
iso-Butylbenzene	0	0.0044	0.012	
Isopentane	0.2551	1.6895	6.3069	
Isoprene	0	0.0478	0.222	
iso-Propylbenzene	0	0.0169	0.06	400
m and p-Xylene	0	1.9562	9.98	2,300
Methylcyclohexane	0.0155	0.2477	1.678	
Methylcyclopentane	0.0297	0.2212	0.838	
MTBE	0	0	0	
Naphthalene	0.004	0.0588	0.16	22.5
n-Butylbenzene	0	0.0129	0.036	
Nonane	0	0.0952	0.314	
n-Propylbenzene	0	0.0563	0.204	
Octane	0.0216	0.0938	0.3	15,300
o-Xylene	0.002	0.5262	2.276	2,300
p-Cymene	0	0.0107	0.0267	
Pentane	0.2094	0.831	5.184	
Propane	0.9786	3.3356	9.356	
Propylene	0.17	0.4909	2.118	
sec-Butylbenzene	0	0.0059	0.016	
Styrene	0	0.1607	1.179	400
tert-Butylbenzene	0	0.0007	0.0156	
Tetrachloroethene	No Data	No Data	No Data	
Tetrachloroethylene	0.0322	0.1006	0.4853	360
Toluene	0.2256	2.5157	16.188	2,000
trans-1,2-Dichloroethylene	0	0	0	105
trans-1,2-Dimethylcyclohexane	0	3E-05	0.002	
trans-1,3-Dichloropropene	0	0	0	
trans-1,4-Dimethylcyclohexane	0.0026	0.017	0.056	
trans-2-Butene	0.014	0.0847	0.3763	
trans-2-Heptene	0	0.007	0.04	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
trans-2-Hexene	0	0.0205	0.102	
trans-2-Octene	0	0.0266	0.094	
trans-2-Pentene	0.0158	0.0865	0.378	
trans-3-Heptene	0	0.0058	0.032	
trans-3-Methyl-2-pentene	0	0.007	0.072	
trans-4-Methyl-2-pentene	0	0.0004	0.0074	
Trichloroethylene	0.0109	0.0896	0.63	115
Undecane	0	0.0806	0.29	
Vinylchloride	0	0.0037	0.014	1
Polar Volatile Organic Compounds				
1-Butanol	0	0.1496	1.62	770
1-Propanol (Propyl alcohol)	0	0.9247	7.62	16,000
2-Butanol	0	0.0005	0.03	
2-Butanone (MEK)	0	0.8948	4.68	1,000
2-Butenal (E) (Crotonaldehyde)	0	0.0395	0.84	
2-Ethoxy-2-Methyl-Propane (ETBE)	0	0	0	
2-Methoxy-2-Methyl-Propane (MTBE)	0	3E-05	0.002	
2-Methyl-2-Propenal (MAC)	0	0.0204	0.538	
2-Methyl Furan	0	0.0009	0.034	
2-Methyl Propanal (Isobutyraldehyde)	0	0.2088	0.74	
2-Pentanone	0	0.2186	2.58	
2-Propenal (Acrolein)	0	0.4132	1.254	23.3
2-Propene Nitrile (Acrylonitrile)	0	0.0009	0.054	0.6
3-Buten-2-one (Methyl Vinyl Ketone, MVK)	0	0.0254	1.18	
3-Methyl Butanal (Isovaleraldehyde)	0	0.0225	0.98	
Acetaldehyde	1	3.6794	15.62	500
Acetone	0.424	3.5912	12.56	48,000
Acetonitrile	0	0.1015	0.18	
Benzaldehyde	0	0.1483	0.42	
Butanal (Butylaldehyde)	0	0.5533	4.34	
Butyl Ester, Acetic Acid (Butyl Acetate)	0	0.2066	3.26	248
Carbon Disulfide	0.02	0.0691	0.32	330
Cyclohexanone	0	0.0075	0.36	
Cyclopentanone	0	0.0053	0.28	
Ethanol	0	4.6848	11.88	19,000
Ethyl Acetate	0	2.0184	18.84	19,000
Ethylene Oxide	0	0.0262	0.2	5
Hexanal	0	0.2891	1.8	
Isobutyl Acetate	0	0.0259	0.4	412
Isobutyl Alcohol	0	0.0359	0.66	
Isopropyl Acetate	0	0.0397	0.68	500
Isopropyl Alcohol	0	0.3983	2.76	24,000
Methanol	0	8.0131	36.794	4,000
Methyl Ester, Acetic Acid (Methyl Acetate)	0	0.042	0.42	412
Methyl Isobutyl Ketone (MIK, MIBK)	0	0.0726	0.22	1,200
Pentanal (Valeraldehyde)	0	0.1685	3.28	

* 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table E.3. Joseph Teres School VOC Analysis
April 14, 2004 to July 15, 2004
Number of samples: 54

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Nonpolar Volatile Organic Compounds				
1,1,1-Trichloroethane	0.108	0.1428	0.209	115,000
1,1,2,2-Tetrachloroethane	0	0	0	
1,1,2-Trichloroethane	0	8E-05	0.0044	
1,1-Dichloroethane	0	0.0011	0.0064	200
1,1-Dichloroethylene	0	6E-05	0.0034	10
1,2,3-Trimethylbenzene	0.0069	0.0497	0.2511	
1,2,4-Trichlorobenzene	0.0045	0.0126	0.036	400
1,2,4-Trimethylbenzene	0.0308	0.2861	1.523	1,000
1,2-Dichlorobenzene	0.002	0.0043	0.01	30,500
1,2-Dichloroethane	0.022	0.0353	0.0505	2
1,2-Dichloropropane	0	0.0074	0.0129	2,400
1,2-Diethylbenzene	0	0.0032	0.0121	
1,3,5-Trimethylbenzene	0.0105	0.0893	0.4646	
1,3-Butadiene	0.0164	0.046	0.142	
1,3-Dichlorobenzene	0	0.0044	0.012	
1,3-Diethylbenzene	0.0017	0.0122	0.0492	
1,4-Dichlorobenzene	0.0174	0.1225	0.432	95
1,4-Dichlorobutane	0	0	0	
1,4-Diethylbenzene	0	0.0092	0.101	
1-Butene/Isobutene	0.0844	0.2083	0.608	
1-Butyne	0	0.0011	0.006	
1-Decene	0	0.0021	0.0178	60,000
1-Heptene	0	0.0016	0.0364	
1-Hexene	0	0.0375	0.13	
1-Methylcyclohexene	0	0.0031	0.0109	
1-Methylcyclopentene	0	0.012	0.038	
1-Nonene	0	0.0132	0.0538	
1-Octene	0	0.0104	0.0386	50,000
1-Pentene	0	0.0702	0.258	
1-Propyne	0.0115	0.032	0.112	
1-Undecene	0	0.0048	0.196	
2,2,3-Trimethylbutane	0	0.0022	0.0127	
2,2,4-Trimethylpentane	0	0.1504	0.544	
2,2,5-Trimethylhexane	0	0.0057	0.024	
2,2-Dimethylbutane	0.0196	0.0803	0.296	
2,2-Dimethylhexane	0	0.0006	0.011	
2,2-Dimethylpentane	0	0.0114	0.0732	
2,2-Dimethylpropane	0	0.0034	0.0131	
2,3,4-Trimethylpentane	0	0.0434	0.178	
2,3-Dimethylbutane	0.0173	0.0966	0.41	
2,3-Dimethylpentane	0.0346	0.1645	0.548	
2,4-Dimethylhexane	0	0.026	0.0956	
2,4-Dimethylpentane	0	0.0706	0.3329	
2,5-Dimethylheptane	No Data	No Data	No Data	
2,5-Dimethylhexane	0	0.0195	0.066	
2-Ethyl-1-Butene	0	0.0015	0.0246	
2-Ethyltoluene	0.0082	0.0678	0.3456	
2-Methyl-1-butene	0.0124	0.0858	0.35	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
2-Methyl-1-Pentene	No Data	No Data	No Data	
2-Methyl-2-butene	0.0161	0.0842	0.29	
2-methyl-2-Pentene	No Data	No Data	No Data	
2-Methylheptane	0	0.0472	0.178	
2-Methylhexane	0.0317	0.175	0.6829	
2-Methylpentane	0.0628	0.375	1.616	
3,6-Dimethyloctane	0	0.001	0.0082	
3-Ethyltoluene	0.0211	0.1768	0.9185	
3-Methyl-1-butene	0.0047	0.0202	0.07	
3-Methyl-1-pentene	0	0.0027	0.0183	
3-Methylheptane	0	0.0473	0.176	
3-Methylhexane	0.0364	0.1913	1.0542	
3-Methyloctane	No Data	No Data	No Data	
3-Methylpentane	0.0411	0.2584	1.148	
4-Ethyltoluene	0.01	0.089	0.496	
4-Methyl-1-pentene	0	0	0	
4-Methylheptane	0	0.0184	0.072	
4-Methyloctane	No Data	No Data	No Data	
Acetylene	0.18152	0.5289	2.926368	56,000
a-Pinene	0	0.1671	0.9618	
Benzene	0.1513	0.3708	0.964	
Benzylchloride	0	0.0031	0.012	
b-Pinene	0	0.0405	0.3747	
Bromochloromethane	No Data	No Data	No Data	
Bromodichloromethane	0	0.0012	0.0367	
Bromoform	0	0.0091	0.0139	55
Bromomethane	0.048	0.0584	0.0819	1,350
Bromotrichloromethane	0	0	0	
Butane	0.2443	1.4595	4.642	
Camphene	0	0.0394	0.1768	
Carbon tetrachloride	0.482	0.6259	0.8278	2.4
Chlorobenzene	0.008	0.0149	0.032	
Chloroethane	0	0.0262	0.0607	
Chloroform	0.06	0.0878	0.192	1
Chloromethane	0.912	1.1396	1.4456	7,000
cis-1,2-Dichloroethylene	0	0.0001	0.004	105
cis-1,2-Dimethylcyclohexane	0	0.0047	0.0262	
cis-1,3-Dichloropropene	0	0	0	
cis-1,3-Dimethylcyclohexane	0	0.0237	0.12	
cis-1,4/t-1,3-Dimethylcyclohexane	0	0.0106	0.042	
cis-2-Butene	0.0112	0.0595	0.228	
cis-2-Heptene	0	0.0023	0.0445	
cis-2-Hexene	0	0.0091	0.034	
cis-2-Octene	No Data	No Data	No Data	
cis-2-Pentene	0.0082	0.0438	0.168	
cis-3-Heptene	0	0.0041	0.0625	
cis-3-Methyl-2-pentene	0	0.0165	0.06	
cis-4-Methyl-2-pentene	0	0.0126	0.044	
Cyclohexane	0	0.0376	0.144	100,000
Cyclohexene	0	0.0006	0.0111	
Cyclopentane	0.0163	0.1508	1.4165	
Cyclopentene	0.0028	0.013	0.042	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Decane	0.0111	0.0863	0.4265	60,000
Dibromochloromethane	0	0.0013	0.0037	
Dibromomethane	0.016	0.0217	0.0256	
Dichloromethane	0.148	0.2826	0.714	220
d-Limonene	0.0062	0.0414	0.214	
Dodecane	0	0.0215	0.1144	
EDB	0	0.0001	0.0031	3
Ethane	0.54552	1.375	2.214474	
Ethylbenzene	0.0517	0.3843	1.9264	1,000
Ethylbromide	0	0.0005	0.0055	
Ethylene	0.18274	0.6913	2.523825	40
Freon11	1.376	1.7849	2.4032	6,000
Freon113	0.494	0.6136	0.7269	800,000
Freon114	0.09	0.1085	0.1256	700,000
Freon12	2.372	2.8934	3.4423	500,000
Freon22	0.5532	1.2189	14.366	350,000
Heptane	0	0.146	1.1836	11,000
Hexachlorobutadiene	0	0.0008	0.0041	
Hexane	0.043	0.264	1.2826	12,000
Hexylbenzene	0	0.0162	0.095	
Indane	0.0042	0.0254	0.1109	
Isobutane	0.1425	0.8768	4.194	
iso-Butylbenzene	0	0.0052	0.0231	
Isopentane	0.2046	1.497	7.274	
Isoprene	0.0128	0.2243	1.328	
iso-Propylbenzene	0.0036	0.0147	0.0575	400
m and p-Xylene	0.1501	1.3952	7.6685	2,300
Methylcyclohexane	0.013	0.0708	0.276	
Methylcyclopentane	0.0256	0.1591	0.632	
MTBE	0	0	0	
Naphthalene	0.014	0.0801	0.254	22.5
n-Butylbenzene	0	0.01	0.036	
Nonane	0.0132	0.0627	0.2911	
n-Propylbenzene	0.009	0.0582	0.2866	
Octane	0	0.0597	0.211	15,300
o-Xylene	0.0522	0.4212	2.3356	2,300
p-Cymene	0.0024	0.013	0.0379	
Pentane	0.1394	1.0857	9.4973	
Propane	0.3662	1.1058	3.064	
Propylene	0.0949	0.2631	0.846	
sec-Butylbenzene	0	0.006	0.029	
Styrene	0.0068	0.1	1.124	400
tert-Butylbenzene	0	0.0016	0.0222	
Tetrachloroethene	No Data	No Data	No Data	
Tetrachloroethylene	0.0351	0.077	0.23	360
Toluene	0.2236	2.0329	7.1348	2,000
trans-1,2-Dichloroethylene	0	4E-05	0.002	105
trans-1,2-Dimethylcyclohexane	0	0.0003	0.0142	
trans-1,3-Dichloropropene	0	0	0	
trans-1,4-Dimethylcyclohexane	0	0.0104	0.052	
trans-2-Butene	0	0.0613	0.234	
trans-2-Heptene	0	0.0042	0.0163	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
trans-2-Hexene	0	0.0183	0.062	
trans-2-Octene	0	0.0154	0.084	
trans-2-Pentene	0.0137	0.0792	0.314	
trans-3-Heptene	0	0.0032	0.0146	
trans-3-Methyl-2-pentene	0	0.0065	0.03	
trans-4-Methyl-2-pentene	0	0.0007	0.0057	
Trichloroethylene	0.0087	0.0529	0.3	115
Undecane	0.0091	0.0739	0.3781	
Vinylchloride	0	0.0008	0.0046	1
Polar Volatile Organic Compounds				
1-Butanol	0	0.1241	1.76	770
1-Propanol (Propyl alcohol)	0	0.2907	3.398	16,000
2-Butanol	0	0	0	
2-Butanone (MEK)	0.298	0.8169	1.86	1,000
2-Butenal (E) (Crotonaldehyde)	0	0.0219	1.064	
2-Ethoxy-2-Methyl-Propane (ETBE)	No Data	No Data	No Data	
2-Methoxy-2-Methyl-Propane (MTBE)	0	0	0	
2-Methyl-2-Propenal (MAC)	0	0.0434	0.59	
2-Methyl Furan	0	0	0	
2-Methyl Propanal (Isobutyraldehyde)	0	0.2884	1.128	
2-Pentanone	0	0.251	0.92	
2-Propenal (Acrolein)	0	0.4036	1.12	23.3
2-Propene Nitrile (Acrylonitrile)	0	0.0013	0.07	0.6
3-Buten-2-one (Methyl Vinyl Ketone, MVK)	0	0.0319	1.72	
3-Methyl Butanal (Isovaleraldehyde)	0	0.0086	0.296	
Acetaldehyde	1.87	4.1373	10.49	500
Acetone	2.48	5.525	13.98	48,000
Acetonitrile	0	0.1835	0.38	
Benzaldehyde	0.06	0.3189	0.94	
Butanal (Butylaldehyde)	0	0.4504	1.31	
Butyl Ester, Acetic Acid (Butyl Acetate)	0	0.9427	6.936	248
Carbon Disulfide	0	0.1356	1.4	330
Cyclohexanone	0	0.0073	0.204	
Cyclopentanone	0	0	0	
Ethanol	1.4	6.6296	18.764	19,000
Ethyl Acetate	0	1.082	10.258	19,000
Ethylene Oxide	0	0.1119	0.6	5
Hexanal	0	0.6204	1.97	
Isobutyl Acetate	0	0.0793	0.386	412
Isobutyl Alcohol	0	0.0811	1.08	
Isopropyl Acetate	0	0.0242	0.31	500
Isopropyl Alcohol	0	0.301	2.192	24,000
Methanol	2.6	10.857	30.298	4,000
Methyl Ester, Acetic Acid (Methyl Acetate)	0	0.0286	0.176	412
Methyl Isobutyl Ketone (MIK, MIBK)	0	0.1368	1.068	1,200
Pentanal (Valeraldehyde)	0	0.1492	1.034	

* 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table E.4. École Margaret Underhill VOC Analysis
July 19, 2004 to October 25, 2004
Number of samples: 56

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Nonpolar Volatile Organic Compounds				
1,1,1-Trichloroethane	0.1	0.134	0.63	115,000
1,1,2,2-Tetrachloroethane	0	0	0	
1,1,2-Trichloroethane	0	0	0	
1,1-Dichloroethane	0	0	0	200
1,1-Dichloroethylene	0	0.000714	0.04	10
1,2,3-Trimethylbenzene	0.008	0.043179	0.15	
1,2,4-Trichlorobenzene	0	0.014607	0.066	400
1,2,4-Trimethylbenzene	0.032	0.231857	0.88	1,000
1,2-Dichlorobenzene	0	0.003571	0.016	30,500
1,2-Dichloroethane	0.018	0.023429	0.04	2
1,2-Dichloropropane	0	0.003929	0.01	2,400
1,2-Diethylbenzene	0	0.002357	0.01	
1,3,5-Trimethylbenzene	0.01	0.074464	0.27	
1,3-Butadiene	0.01	0.050429	0.15	
1,3-Dichlorobenzene	0	0.005143	0.02	
1,3-Diethylbenzene	0	0.013143	0.04	
1,4-Dichlorobenzene	0.01	0.054179	0.326	95
1,4-Dichlorobutane	0	0	0	
1,4-Diethylbenzene	0	0	0	
1-Butene/Isobutene	0	0.210643	0.552	
1-Butyne	0	0.001107	0.01	
1-Decene	0	0.002143	0.07	60,000
1-Heptene	0	0.002964	0.166	
1-Hexene	0	0.03525	0.1	
1-Methylcyclohexene	0	0.002893	0.01	
1-Methylcyclopentene	0	0.011607	0.05	
1-Nonene	0	0.017679	0.33	
1-Octene	0	0.012857	0.134	50,000
1-Pentene	0	0.037464	0.174	
1-Propyne	0.01	0.042857	0.35	
1-Undecene	0	0.00225	0.088	
2,2,3-Trimethylbutane	0	0.003036	0.01	
2,2,4-Trimethylpentane	0	0.162429	0.58	
2,2,5-Trimethylhexane	0	0.007	0.03	
2,2-Dimethylbutane	0.028	0.086429	0.24	
2,2-Dimethylhexane	0	0	0	
2,2-Dimethylpentane	0	0.012571	0.04	
2,2-Dimethylpropane	0	0.000536	0.02	
2,3,4-Trimethylpentane	0.01	0.047536	0.16	
2,3-Dimethylbutane	0.028	0.115536	0.33	
2,3-Dimethylpentane	0.05	0.202893	1.3	
2,4-Dimethylhexane	0.006	0.027714	0.09	
2,4-Dimethylpentane	0.02	0.079786	0.27	
2,5-Dimethylheptane	No Data	No Data	No Data	
2,5-Dimethylhexane	0.004	0.022036	0.07	
2-Ethyl-1-Butene	0	0	0	
2-Ethyltoluene	0.008	0.055643	0.19	
2-Methyl-1-butene	0.02	0.090429	0.258	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
2-Methyl-1-Pentene	No Data	No Data	No Data	
2-Methyl-2-butene	0	0.0845	0.25	
2-methyl-2-Pentene	No Data	No Data	No Data	
2-Methylheptane	0.01	0.053929	0.17	
2-Methylhexane	0.048	0.275036	3.9	
2-Methylpentane	0.076	0.393429	1.24	
3,6-Dimethyloctane	0	0	0	
3-Ethyltoluene	0.02	0.137929	0.5	
3-Methyl-1-butene	0.006	0.021	0.054	
3-Methyl-1-pentene	0	0.0025	0.02	
3-Methylheptane	0.01	0.055679	0.19	
3-Methylhexane	0	0.283107	4.68	
3-Methyloctane	No Data	No Data	No Data	
3-Methylpentane	0.056	0.276357	0.81	
4-Ethyltoluene	0.01	0.072393	0.25	
4-Methyl-1-pentene	0	0	0	
4-Methylheptane	0.004	0.02325	0.07	
4-Methyloctane	No Data	No Data	No Data	
Acetylene	0.232897	0.898569	7.8	56,000
a-Pinene	0	0.222536	1.48	
Benzene	0.176	0.550143	2.73	
Benzylchloride	0	0.006143	0.012	
b-Pinene	0	0.23475	1.39	
Bromochloromethane	No Data	No Data	No Data	
Bromodichloromethane	0	0	0	
Bromoform	0.004	0.014357	0.03	55
Bromomethane	0.03	0.054964	0.216	1,350
Bromotrichloromethane	0	0	0	
Butane	0.41	1.730107	5.18	
Camphene	0	0.030643	0.148	
Carbon tetrachloride	0.47	0.572393	0.71	2.4
Chlorobenzene	0	0.015214	0.034	
Chloroethane	0.01	0.020643	0.07	
Chloroform	0.058	0.108643	0.21	1
Chloromethane	0.74	0.979893	1.18	7,000
cis-1,2-Dichloroethylene	0	0.000143	0.002	105
cis-1,2-Dimethylcyclohexane	0	0.005857	0.03	
cis-1,3-Dichloropropene	0	0	0	
cis-1,3-Dimethylcyclohexane	0	0.026036	0.08	
cis-1,4/t-1,3-Dimethylcyclohexane	0	0.010786	0.04	
cis-2-Butene	0.02	0.059929	0.2	
cis-2-Heptene	0	0	0	
cis-2-Hexene	0	0.009857	0.03	
cis-2-Octene	No Data	No Data	No Data	
cis-2-Pentene	0.01	0.045286	0.112	
cis-3-Heptene	0	0.002179	0.068	
cis-3-Methyl-2-pentene	0	0.017643	0.06	
cis-4-Methyl-2-pentene	0	0.011679	0.04	
Cyclohexane	0.01	0.068964	0.876	100,000
Cyclohexene	0	0	0	
Cyclopentane	0.024	0.408857	1.99	
Cyclopentene	0	0.013286	0.04	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Decane	0.01	0.131571	0.97	60,000
Dibromochloromethane	0	0.00075	0.006	
Dibromomethane	0.016	0.01975	0.024	
Dichloromethane	0.13	28.40289	1572.39	220
d-Limonene	0.008	0.0435	0.14	
Dodecane	0.01	0.038	0.1	
EDB	0	0.000393	0.01	3
Ethane	0.158619	1.456733	3.84	
Ethylbenzene	0.052	0.450071	2.34	1,000
Ethylbromide	0	0.0005	0.024	
Ethylene	0.376289	1.026066	2.5	40
Freon11	1.27	1.624893	2.02	6,000
Freon113	0.43	0.554964	0.7	800,000
Freon114	0.08	0.099286	0.12	700,000
Freon12	1.98	2.51	3.04	500,000
Freon22	0.522	1.290857	2.99	350,000
Heptane	0.036	0.149179	1.48	11,000
Hexachlorobutadiene	0	3.57E-05	0.002	
Hexane	0.06	0.259786	1.56	12,000
Hexylbenzene	0	0	0	
Indane	0.004	0.024393	0.08	
Isobutane	0.19	0.847143	2.8	
iso-Butylbenzene	0	0.004393	0.02	
Isopentane	0.346	1.846143	6.58	
Isoprene	0.02	0.381929	2.984	
iso-Propylbenzene	0.004	0.016679	0.05	400
m and p-Xylene	0.13	1.5045	7.88	2,300
Methylcyclohexane	0.014	0.076357	0.53	
Methylcyclopentane	0.034	0.203107	0.72	
MTBE	0	0	0	
Naphthalene	0.024	0.088607	0.25	22.5
n-Butylbenzene	0	0.010214	0.04	
Nonane	0.014	0.089964	0.73	
n-Propylbenzene	0.01	0.051107	0.17	
Octane	0.016	0.059286	0.19	15,300
o-Xylene	0.048	0.433893	2.43	2,300
p-Cymene	0	0.013607	0.07	
Pentane	0.18	2.378036	12.518	
Propane	0.418	1.494679	6.65	
Propylene	0.09	0.310964	0.86	
sec-Butylbenzene	0	0.004893	0.02	
Styrene	0.008	0.096786	0.42	400
tert-Butylbenzene	0	0	0	
Tetrachloroethene	No Data	No Data	No Data	
Tetrachloroethylene	0.022	0.155536	2.82	360
Toluene	0.31	3.219607	26.07	2,000
trans-1,2-Dichloroethylene	0	0.000536	0.03	105
trans-1,2-Dimethylcyclohexane	0	3.57E-05	0.002	
trans-1,3-Dichloropropene	0	0	0	
trans-1,4-Dimethylcyclohexane	0	0.011571	0.04	
trans-2-Butene	0.01	0.058714	0.21	
trans-2-Heptene	0	0.004714	0.02	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
trans-2-Hexene	0	0.017107	0.05	
trans-2-Octene	0	0.0165	0.06	
trans-2-Pentene	0.02	0.08275	0.21	
trans-3-Heptene	0	0.003429	0.01	
trans-3-Methyl-2-pentene	0	0.006286	0.03	
trans-4-Methyl-2-pentene	0	0	0	
Trichloroethylene	0.02	0.080214	0.27	115
Undecane	0.018	0.125964	1.16	
Vinylchloride	0	0.000714	0.01	1
1-Butanol	0	0.051036	0.844	770
1-Propanol (Propyl alcohol)	0	0.138857	1.076	16,000
2-Butanol	0	0.000429	0.024	
2-Butanone (MEK)	0	0.857393	2.848	1,000
2-Butenal (E) (Crotonaldehyde)	0	0.095786	2.56	
2-Ethoxy-2-Methyl-Propane (ETBE)	No Data	No Data	No Data	
2-Methoxy-2-Methyl-Propane (MTBE)	0	7.14E-05	0.004	
2-Methyl-2-Propenal (MAC)	0	0.1375	0.986	
2-Methyl Furan	0	0.000679	0.038	
2-Methyl Propanal (Isobutyraldehyde)	0	0.216393	0.704	
2-Pentanone	0	0.263286	1.41	
2-Propenal (Acrolein)	0	0.463107	1.902	23.3
2-Propene Nitrile (Acrylonitrile)	0	0.007036	0.24	0.6
3-Buten-2-one (Methyl Vinyl Ketone, MVK)	0	0.030821	1.718	
3-Methyl Butanal (Isovaleraldehyde)	0	0.029071	0.822	
Acetaldehyde	0.314	3.642214	20.03	500
Acetone	0.714	4.714107	11.246	48,000
Acetonitrile	0	0.21575	0.636	
Benzaldehyde	0.068	0.361643	0.618	
Butanal (Butylaldehyde)	0	0.4945	7.724	
Butyl Ester, Acetic Acid (Butyl Acetate)	0	0.985	5.712	248
Carbon Disulfide	0.026	0.202071	2.464	330
Cyclohexanone	0	0.00275	0.078	
Cyclopentanone	0	0.001357	0.076	
Ethanol	0	7.936929	50.65	19,000
Ethyl Acetate	0	1.03175	5.736	19,000
Ethylene Oxide	0	0.096571	0.822	5
Hexanal	0	1.348679	23.24	
Isobutyl Acetate	0	0.167821	1.064	412
Isobutyl Alcohol	0	0.05725	0.694	
Isopropyl Acetate	0	0.003214	0.062	500
Isopropyl Alcohol	0	0.111393	1.3	24,000
Methanol	1.04	12.95475	140.124	4,000
Methyl Ester, Acetic Acid (Methyl Acetate)	0	0.072214	3.08	412
Methyl Isobutyl Ketone (MIK, MIBK)	0	0.147214	2.72	1,200
Pentanal (Valeraldehyde)	0	0.40525	11.224	

* 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table E.5. Phase I VOC Analysis
July 20, 2003 to October 25, 2004
Number of samples: 235

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Nonpolar Volatile Organic Compounds				
1,1,1-Trichloroethane	0.1	0.142654	0.63	115,000
1,1,2,2-Tetrachloroethane	0	1.7E-05	0.004	
1,1,2-Trichloroethane	0	3.57E-05	0.0044	
1,1-Dichloroethane	0	0.000292	0.0064	200
1,1-Dichloroethylene	0	0.000185	0.04	10
1,2,3-Trimethylbenzene	0	0.105577	2.84	
1,2,4-Trichlorobenzene	0	0.011272	0.066	400
1,2,4-Trimethylbenzene	0.002	0.651574	16.996	1,000
1,2-Dichlorobenzene	0	0.003608	0.016	30,500
1,2-Dichloroethane	0.018	0.033398	0.0985	2
1,2-Dichloropropane	0	0.007562	0.018	2,400
1,2-Diethylbenzene	0	0.004043	0.046	
1,3,5-Trimethylbenzene	0	0.199016	5.152	
1,3-Butadiene	0.01	0.074101	0.39	
1,3-Dichlorobenzene	0	0.003749	0.02	
1,3-Diethylbenzene	0	0.021678	0.394	
1,4-Dichlorobenzene	0.008	0.120375	1.302	95
1,4-Dichlorobutane	0	0.000323	0.076	
1,4-Diethylbenzene	0	0.03304	0.882	
1-Butene/Isobutene	0	0.271394	1.286	
1-Butyne	0	0.002538	0.016	
1-Decene	0	0.001983	0.07	60,000
1-Heptene	0	0.001908	0.166	
1-Hexene	0	0.040298	0.178	
1-Methylcyclohexene	0	0.00487	0.026	
1-Methylcyclopentene	0	0.015685	0.084	
1-Nonene	0	0.022061	0.536	
1-Octene	0	0.01172	0.14	50,000
1-Pentene	0	0.073899	0.456	
1-Propyne	0.01	0.05187	0.35	
1-Undecene	0	0.002518	0.196	
2,2,3-Trimethylbutane	0	0.00346	0.018	
2,2,4-Trimethylpentane	0	0.20615	1.754	
2,2,5-Trimethylhexane	0	0.00843	0.052	
2,2-Dimethylbutane	0.014	0.087608	0.382	
2,2-Dimethylhexane	0	0.000186	0.0112	
2,2-Dimethylpentane	0	0.014974	0.094	
2,2-Dimethylpropane	0	0.00874	0.118	
2,3,4-Trimethylpentane	0	0.058666	0.384	
2,3-Dimethylbutane	0.0173	0.120087	0.572	
2,3-Dimethylpentane	0.0346	0.233636	1.62	
2,4-Dimethylhexane	0	0.039807	0.206	
2,4-Dimethylpentane	0	0.091743	0.49	
2,5-Dimethylheptane	No Data	No Data	No Data	
2,5-Dimethylhexane	0	0.030196	0.144	
2-Ethyl-1-Butene	0	0.000707	0.0355	
2-Ethyltoluene	0	0.160434	4.424	
2-Methyl-1-butene	0.0124	0.111312	0.974	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
2-Methyl-1-Pentene	No Data	No Data	No Data	
2-Methyl-2-butene	0	0.111709	1.182	
2-methyl-2-Pentene	No Data	No Data	No Data	
2-Methylheptane	0	0.08663	0.464	
2-Methylhexane	0.0317	0.273196	3.9	
2-Methylpentane	0.0628	0.444503	2.372	
3,6-Dimethyloctane	0	0.000471	0.0239	
3-Ethyltoluene	0.002	0.376987	9.56	
3-Methyl-1-butene	0.0047	0.027159	0.25	
3-Methyl-1-pentene	0	0.004911	0.032	
3-Methylheptane	0	0.077735	0.402	
3-Methylhexane	0	0.282358	4.68	
3-Methyloctane	No Data	No Data	No Data	
3-Methylpentane	0.0411	0.334077	1.418	
4-Ethyltoluene	0.002	0.190837	5.1	
4-Methyl-1-pentene	0	0.003161	0.0989	
4-Methylheptane	0	0.032517	0.154	
4-Methyloctane	No Data	No Data	No Data	
Acetylene	0.181519	0.991289	7.8	56,000
a-Pinene	0	0.140657	1.48	
Benzene	0.1513	0.657434	2.81	
Benzylchloride	0	0.002691	0.012	
b-Pinene	0	0.094064	1.39	
Bromochloromethane	0	0.000179	0.008	
Bromodichloromethane	0	0.000388	0.0367	
Bromoform	0	0.01562	0.044	55
Bromomethane	0.03	0.056631	0.216	1,350
Bromotrichloromethane	0	0	0	
Butane	0.2443	2.628093	37.6	
Camphene	0	0.025361	0.1768	
Carbon tetrachloride	0.456	0.608704	0.8278	2.4
Chlorobenzene	0	0.010798	0.036	
Chloroethane	0	0.022959	0.154	
Chloroform	0.058	0.097466	0.346	1
Chloromethane	0.74	1.096814	1.4456	7,000
cis-1,2-Dichloroethylene	0	9.87E-05	0.004	105
cis-1,2-Dimethylcyclohexane	0	0.013086	0.16	
cis-1,3-Dichloropropene	0	0	0	
cis-1,3-Dimethylcyclohexane	0	0.063643	0.608	
cis-1,4/t-1,3-Dimethylcyclohexane	0	0.022711	0.234	
cis-2-Butene	0.0112	0.077602	1.016	
cis-2-Heptene	0	0.002125	0.098	
cis-2-Hexene	0	0.01138	0.054	
cis-2-Octene	No Data	No Data	No Data	
cis-2-Pentene	0.0082	0.052449	0.404	
cis-3-Heptene	0	0.005221	0.246	
cis-3-Methyl-2-pentene	0	0.023256	0.112	
cis-4-Methyl-2-pentene	0	0.014416	0.074	
Cyclohexane	0	0.075038	1.024	100,000
Cyclohexene	0	0.000594	0.022	
Cyclopentane	0.0152	0.19371	1.99	
Cyclopentene	0	0.015813	0.088	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Decane	0.002	0.128527	1.218	60,000
Dibromochloromethane	0	0.001755	0.006	
Dibromomethane	0.016	0.024033	0.032	
Dichloromethane	0.13	7.060938	1572.39	220
d-Limonene	0	0.038042	0.214	
Dodecane	0	0.035715	0.43	
EDB	0	0.000157	0.01	3
Ethane	0.158619	2.503763	16.01506	
Ethylbenzene	0.024	0.544424	3.956	1,000
Ethylbromide	0	0.00037	0.024	
Ethylene	0.182735	1.371409	6.76766	40
Freon11	1.27	1.705884	2.4032	6,000
Freon113	0.43	0.591656	0.7269	800,000
Freon114	0.08	0.106643	0.134	700,000
Freon12	1.98	2.682328	3.4423	500,000
Freon22	0.522	0.99465	14.366	350,000
Heptane	0	0.209934	1.59	11,000
Hexachlorobutadiene	0	0.00042	0.0041	
Hexane	0.043	0.365592	1.994	12,000
Hexylbenzene	0	0.009122	0.096	
Indane	0	0.039218	0.648	
Isobutane	0.1425	1.446754	21.83	
iso-Butylbenzene	0	0.008559	0.21	
Isopentane	0.2046	1.972433	22.064	
Isoprene	0	0.250687	6.534	
iso-Propylbenzene	0	0.028951	0.604	400
m and p-Xylene	0	2.055497	16.44	2,300
Methylcyclohexane	0.013	0.167547	2.214	
Methylcyclopentane	0.0256	0.22039	0.858	
MTBE	0	0	0	
Naphthalene	0.004	0.087111	0.372	22.5
n-Butylbenzene	0	0.015266	0.19	
Nonane	0	0.122378	3.438	
n-Propylbenzene	0	0.118852	3.12	
Octane	0	0.130043	1.266	15,300
o-Xylene	0.002	0.565417	4.688	2,300
p-Cymene	0	0.015942	0.15	
Pentane	0.1394	1.339573	12.518	
Propane	0.3662	2.170788	9.356	
Propylene	0.09	0.414076	2.118	
sec-Butylbenzene	0	0.010041	0.234	
Styrene	0	0.124794	1.179	400
tert-Butylbenzene	0	0.000689	0.038	
Tetrachloroethene	No Data	No Data	No Data	
Tetrachloroethylene	0.022	0.101985	2.82	360
Toluene	0.2236	2.74243	26.07	2,000
trans-1,2-Dichloroethylene	0	0.000136	0.03	105
trans-1,2-Dimethylcyclohexane	0	0.000163	0.0142	
trans-1,3-Dichloropropene	0	0	0	
trans-1,4-Dimethylcyclohexane	0	0.024765	0.202	
trans-2-Butene	0	0.080158	1.108	
trans-2-Heptene	0	0.006244	0.04	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
trans-2-Hexene	0	0.021555	0.102	
trans-2-Octene	0	0.048105	0.562	
trans-2-Pentene	0.0137	0.095637	0.774	
trans-3-Heptene	0	0.00512	0.032	
trans-3-Methyl-2-pentene	0	0.008352	0.072	
trans-4-Methyl-2-pentene	0	0.000276	0.0074	
Trichloroethylene	0	0.08566	0.63	115
Undecane	0	0.117149	1.494	
Vinylchloride	0	0.002017	0.066	1
Polar Volatile Organic Compounds				
1-Butanol	0	0.085881	1.76	770
1-Propanol (Propyl alcohol)	0	0.396757	7.62	16,000
2-Butanol	0	0.00023	0.03	
2-Butanone (MEK)	0	0.951779	4.68	1,000
2-Butenal (E) (Crotonaldehyde)	0	0.080196	7.64	
2-Ethoxy-2-Methyl-Propane (ETBE)	0	0	0	
2-Methoxy-2-Methyl-Propane (MTBE)	0	3.57E-05	0.004	
2-Methyl-2-Propenal (MAC)	0	0.06914	0.986	
2-Methyl Furan	0	0.000391	0.038	
2-Methyl Propanal (Isobutyraldehyde)	0	0.214323	1.128	
2-Pentanone	0	0.181472	2.58	
2-Propenal (Acrolein)	0	0.682494	34.254	23.3
2-Propene Nitrile (Acrylonitrile)	0	0.002468	0.24	0.6
3-Buten-2-one (Methyl Vinyl Ketone, MVK)	0	0.184494	26.906	
3-Methyl Butanal (Isovaleraldehyde)	0	0.017949	0.98	
Acetaldehyde	0.314	3.948179	28.476	500
Acetone	0.424	3.979285	16.42	48,000
Acetonitrile	0	0.173192	0.636	
Benzaldehyde	0	0.243719	0.94	
Butanal (Butylaldehyde)	0	0.739004	22.856	
Butyl Ester, Acetic Acid (Butyl Acetate)	0	0.827413	6.936	248
Carbon Disulfide	0	0.157915	2.464	330
Cyclohexanone	0	0.004187	0.36	
Cyclopentanone	0	0.001779	0.28	
Ethanol	0	7.355089	57.016	19,000
Ethyl Acetate	0	1.279436	18.84	19,000
Ethylene Oxide	0	0.08154	0.826	5
Hexanal	0	0.774434	23.24	
Isobutyl Acetate	0	0.096221	1.064	412
Isobutyl Alcohol	0	0.059532	1.08	
Isopropyl Acetate	0	0.018145	0.68	500
Isopropyl Alcohol	0	0.221149	2.76	24,000
Methanol	0	11.10379	140.124	4,000
Methyl Ester, Acetic Acid (Methyl Acetate)	0	0.036298	3.08	412
Methyl Isobutyl Ketone (MIK, MIBK)	0	0.148332	2.77	1,200
Pentanal (Valeraldehyde)	0	0.281506	11.224	

** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table E.6. Phase II VOC Analysis
November 15, 2004 to March 8, 2005
Number of samples: 62

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Nonpolar Volatile Organic Compounds				
1,1,1-Trichloroethane	0.1	0.114869	0.186	115,000
1,1,2,2-Tetrachloroethane	0	0.004098	0.25	
1,1,2-Trichloroethane	0	0	0	
1,1-Dichloroethane	0	0.002341	0.01	200
1,1-Dichloroethylene	0	0.000131	0.006	10
1,2,3-Trimethylbenzene	0	0.115838	0.588	
1,2,4-Trichlorobenzene	0.002	0.019425	0.076	400
1,2,4-Trimethylbenzene	0	0.734782	5.476	1,000
1,2-Dichlorobenzene	0	0.006467	0.03	30,500
1,2-Dichloroethane	0.034	0.039892	0.066	2
1,2-Dichloropropane	0.008	0.0102	0.016	2,400
1,2-Diethylbenzene	0	0.004903	0.022	
1,3,5-Trimethylbenzene	0.006	0.228077	1.698	
1,3-Butadiene	0.032	0.123451	0.406	
1,3-Dichlorobenzene	0	0.00798	0.06	
1,3-Diethylbenzene	0.0017	0.021369	0.11	
1,4-Dichlorobenzene	0	0.04352	0.308	95
1,4-Dichlorobutane	0	0.001148	0.04	
1,4-Diethylbenzene	0	0.028411	0.15	
1-Butene/Isobutene	0.17	0.404311	1.2	
1-Butyne	0	0.005816	0.018	
1-Decene	0	0.001213	0.03	60,000
1-Heptene	0	0.001803	0.07	
1-Hexene	0	0.058733	0.248	
1-Methylcyclohexene	0.002	0.010398	0.09	
1-Methylcyclopentene	0.006	0.02789	0.134	
1-Nonene	0	0.024262	0.49	
1-Octene	0	0.00902	0.068	50,000
1-Pentene	0	0.059672	0.298	
1-Propyne	0.0343	0.083926	0.24	
1-Undecene	0	0.002098	0.07	
2,2,3-Trimethylbutane	0	0.006507	0.05	
2,2,4-Trimethylpentane	0	0.29707	0.946	
2,2,5-Trimethylhexane	0	0.015789	0.056	
2,2-Dimethylbutane	0.046	0.132452	0.686	
2,2-Dimethylhexane	0	0.009425	0.058	
2,2-Dimethylpentane	0.006	0.026508	0.254	
2,2-Dimethylpropane	0	0.012641	0.04	
2,3,4-Trimethylpentane	0	0.084431	0.274	
2,3-Dimethylbutane	0.056	0.180587	1.138	
2,3-Dimethylpentane	0.08	0.299252	1.348	
2,4-Dimethylhexane	0	0.058682	0.216	
2,4-Dimethylpentane	0.032	0.138889	0.778	
2,5-Dimethylheptane	No Data	No Data	No Data	
2,5-Dimethylhexane	0.014	0.047244	0.186	
2-Ethyl-1-Butene	0	0.003508	0.026	
2-Ethyltoluene	0	0.173236	1.23	
2-Methyl-1-butene	0.028	0.112823	0.528	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
2-Methyl-1-Pentene	No Data	No Data	No Data	
2-Methyl-2-butene	0.036	0.162352	0.872	
2-methyl-2-Pentene	No Data	No Data	No Data	
2-Methylheptane	0.036	0.130025	0.59	
2-Methylhexane	0.098	0.39212	2.452	
2-Methylpentane	0.202	0.750857	4.864	
3,6-Dimethyloctane	0	0.007075	0.08	
3-Ethyltoluene	0.02	0.427979	3.018	
3-Methyl-1-butene	0.008	0.025928	0.094	
3-Methyl-1-pentene	0	0.007438	0.028	
3-Methylheptane	0.036	0.126023	0.534	
3-Methylhexane	0.112	0.428454	2.638	
3-Methyloctane	No Data	No Data	No Data	
3-Methylpentane	0.188	0.540815	3.87	
4-Ethyltoluene	0.0238	0.217844	1.482	
4-Methyl-1-pentene	0	0.001661	0.018	
4-Methylheptane	0.01	0.049628	0.206	
4-Methyloctane	No Data	No Data	No Data	
Acetylene	0.581446	1.524558	3.788991	56,000
a-Pinene	0	0.139352	0.808	
Benzene	0.446	1.196287	19.042	
Benzylchloride	0	0.010887	0.37	
b-Pinene	0	0.012623	0.206	
Bromochloromethane	No Data	No Data	No Data	
Bromodichloromethane	0	0.000852	0.03	
Bromoform	0	0.016602	0.0245	55
Bromomethane	0.04	0.048672	0.06	1,350
Bromotrichloromethane	0	0.000721	0.02	
Butane	1.524	4.638344	17.21	
Camphene	0	0.033803	0.39	
Carbon tetrachloride	0.42	0.54979	0.6878	2.4
Chlorobenzene	0	0.02581	0.69	
Chloroethane	0.009	0.016708	0.032	
Chloroform	0.058	0.077833	0.16	1
Chloromethane	0.856	1.043466	1.288	7,000
cis-1,2-Dichloroethylene	0	0.00023	0.008	105
cis-1,2-Dimethylcyclohexane	0	0.025862	0.122	
cis-1,3-Dichloropropene	0	0	0	
cis-1,3-Dimethylcyclohexane	0.014	0.09822	0.482	
cis-1,4/t-1,3-Dimethylcyclohexane	0.0077	0.041577	0.19	
cis-2-Butene	0.018	0.100785	0.552	
cis-2-Heptene	0	0.005715	0.092	
cis-2-Hexene	0	0.018257	0.072	
cis-2-Octene	0.02	0.02	0.02	
cis-2-Pentene	0.012	0.060408	0.288	
cis-3-Heptene	0	0.03868	0.53	
cis-3-Methyl-2-pentene	0.008	0.03598	0.172	
cis-4-Methyl-2-pentene	0.004	0.018675	0.08	
Cyclohexane	0.03	0.118977	1.588	100,000
Cyclohexene	0	0.006533	0.032	
Cyclopentane	0.13	0.329331	1.318	
Cyclopentene	0.006	0.022536	0.102	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
Decane	0	0.10243	0.472	60,000
Dibromochloromethane	0	0.002892	0.0046	
Dibromomethane	0.018	0.027059	0.034	
Dichloromethane	0.178	0.412595	2.172	220
d-Limonene	0	0.038577	0.312	
Dodecane	0	0.03309	0.2	
EDB	0	0.001461	0.03	3
Ethane	1.969381	3.722963	7.697983	
Ethylbenzene	0.142	1.003379	5.704	1,000
Ethylbromide	0	0.004459	0.21	
Ethylene	0.78686	2.147001	6.021589	40
Freon11	1.358	1.593064	2.5438	6,000
Freon113	0.47	0.555648	0.73	800,000
Freon114	0.084	0.098775	0.128	700,000
Freon12	2.116	2.437902	3.14	500,000
Freon22	0.6455	1.516911	4.374	350,000
Heptane	0.04	0.324641	1.76	11,000
Hexachlorobutadiene	0	0.000705	0.004	
Hexane	0.16	0.58302	4.45	12,000
Hexylbenzene	0	0.005536	0.0871	
Indane	0	0.048628	0.232	
Isobutane	0.692	2.821726	16.94	
iso-Butylbenzene	0	0.010103	0.054	
Isopentane	0.848	2.959161	19.552	
Isoprene	0	0.060636	0.28	
iso-Propylbenzene	0.0064	0.034597	0.17	400
m and p-Xylene	0.01	3.122879	17.348	2,300
Methylcyclohexane	0.048	0.182449	1.31	
Methylcyclopentane	0.08	0.372928	2.936	
MTBE	0	0	0	
Naphthalene	0	0.074216	0.4	22.5
n-Butylbenzene	0	0.017895	0.09	
Nonane	0.01	0.144595	0.734	
n-Propylbenzene	0.0195	0.140515	0.836	
Octane	0	0.174439	0.834	15,300
o-Xylene	0.1415	0.86497	4.98	2,300
p-Cymene	0	0.014987	0.06	
Pentane	0.45	1.422361	7.014	
Propane	1.116	3.938579	11.35	
Propylene	0.23	0.673802	1.974	
sec-Butylbenzene	0.0013	0.013031	0.06	
Styrene	0	0.114259	0.524	400
tert-Butylbenzene	0	0.001475	0.06	
Tetrachloroethene	No Data	No Data	No Data	
Tetrachloroethylene	0.034	0.105085	0.766	360
Toluene	0.658	6.182379	94.918	2,000
trans-1,2-Dichloroethylene	0	0	0	105
trans-1,2-Dimethylcyclohexane	0	0.000361	0.01	
trans-1,3-Dichloropropene	0	3.28E-05	0.002	
trans-1,4-Dimethylcyclohexane	0.0066	0.038225	0.182	
trans-2-Butene	0.02	0.125426	0.828	
trans-2-Heptene	0.0028	0.010051	0.042	

Volatile Organic Compound	VOC Concentration (µg/m³)			Ambient Air Quality Criteria (µg/m³)*
	Minimum	Average	Maximum	
trans-2-Hexene	0.008	0.030148	0.128	
trans-2-Octene	0.01	0.085359	0.446	
trans-2-Pentene	0	0.111667	0.566	
trans-3-Heptene	0	0.008643	0.038	
trans-3-Methyl-2-pentene	0.004	0.015156	0.072	
trans-4-Methyl-2-pentene	0	0.000295	0.006	
Trichloroethylene	0	0.072354	0.424	115
Undecane	0.0029	0.095711	0.452	
Vinylchloride	0	0.00432	0.01	1
Polar Volatile Organic Compounds				
1-Butanol	0	0.463161	8.03	770
1-Propanol (Propyl alcohol)	0	0.478645	2.58	16,000
2-Butanol	0	0	0	
2-Butanone (MEK)	0	2.763548	25.15	1,000
2-Butenal (E) (Crotonaldehyde)	0	0.005903	0.366	
2-Ethoxy-2-Methyl-Propane (ETBE)	No Data	No Data	No Data	
2-Methoxy-2-Methyl-Propane (MTBE)	0	0	0	
2-Methyl-2-Propenal (MAC)	0	0.018323	0.87	
2-Methyl Furan	0	0	0	
2-Methyl Propanal (Isobutyraldehyde)	0	0.200613	1.97	
2-Pentanone	0	0.122645	0.582	
2-Propenal (Acrolein)	0	0.290194	1.78	23.3
2-Propene Nitrile (Acrylonitrile)	0	0.001645	0.062	0.6
3-Buten-2-one (Methyl Vinyl Ketone, MVK)	0	0.003516	0.218	
3-Methyl Butanal (Isovaleraldehyde)	0	0.005032	0.122	
Acetaldehyde	1.26	3.337226	20.21	500
Acetone	1.456	4.706323	43.31	48,000
Acetonitrile	0	0.084452	0.292	
Benzaldehyde	0	0.124161	1.66	
Butanal (Butylaldehyde)	0	0.386839	1.87	
Butyl Ester, Acetic Acid (Butyl Acetate)	0	1.504581	24.52	248
Carbon Disulfide	0.014	0.047161	0.39	330
Cyclohexanone	0	0.004806	0.186	
Cyclopentanone	0	0	0	
Ethanol	0.966	6.024387	56.38	19,000
Ethyl Acetate	0	1.148355	8.57	19,000
Ethylene Oxide	0	0.01771	0.212	5
Hexanal	0	0.285839	1.62	
Isobutyl Acetate	0	0.07171	2.19	412
Isobutyl Alcohol	0	0.105323	3.82	
Isopropyl Acetate	0	0	0	500
Isopropyl Alcohol	0	1.299581	10.15	24,000
Methanol	1.828	10.12755	50.34	4,000
Methyl Ester, Acetic Acid (Methyl Acetate)	0	0.027	0.266	412
Methyl Isobutyl Ketone (MIK, MIBK)	0	0.333806	2.71	1,200
Pentanal (Valeraldehyde)	0	0.085742	0.492	

** 24-hour average air quality criteria from the Ontario Ministry of the Environment, where available, were used in the analysis.

Table E.7. Summary of Winnipeg Data – Nonpolar VOCs
Winnipeg Air Quality Monitoring Station: Ellen Street, 1997 to 1999*

Nonpolar Volatile Organic Compound	VOC Concentration (µg/m^3)		
	Minimum	Average	Maximum
1,1,1-Trichloroethane	0.29	0.47	0.87
1,1,2,2-Tetrachloroethane	0.00	0.03	0.09
1,1,2-Trichloroethane	0.00	0.02	0.11
1,1-Dichloroethane	0.00	0.02	0.07
1,1-Dichloroethylene	0.00	0.04	0.10
1,2,3-Trimethylbenzene	0.00	0.20	0.72
1,2,4-Trichlorobenzene	0.00	0.00	0.00
1,2,4-Trimethylbenzene	0.03	0.79	3.12
1,2-Dichlorobenzene	0.00	0.00	0.00
1,2-Dichloroethane	0.02	0.06	0.12
1,2-Dichloropropane	0.00	0.01	0.06
1,2-Diethylbenzene	0.00	0.02	0.06
1,3,5-Trimethylbenzene	0.00	0.25	0.94
1,3-Butadiene	0.00	0.22	0.74
1,3-Dichlorobenzene	0.00	0.00	0.00
1,3-Diethylbenzene	0.00	0.05	0.16
1,4-Dichlorobenzene	0.02	0.10	0.28
1,4-Dichlorobutane	0.00	0.00	0.04
1,4-Diethylbenzene	0.00	0.19	0.72
1-Butene/Isobutene	0.28	0.90	2.66
1-Butyne	0.00	0.01	0.05
1-Decene	0.00	0.05	1.26
1-Heptene	0.00	0.15	2.65
1-Hexene	0.00	0.23	0.73
1-Methylcyclohexene	0.00	0.07	0.14
1-Methylcyclopentene	0.02	0.11	0.42
1-Nonene	0.00	0.01	0.18
1-Octene	0.00	0.03	0.22
1-Pentene	0.06	0.21	0.64
1-Propyne	0.05	0.14	0.32
2,2,3-Trimethylbutane	0.00	0.00	0.05
2,2,4-Trimethylpentane	0.26	0.83	3.84
2,2,5-Trimethylhexane	0.00	0.03	0.14
2,2-Dimethylbutane	0.09	0.28	1.02
2,2-Dimethylhexane	0.00	0.03	0.10
2,2-Dimethylpentane	0.00	0.06	0.34
2,2-Dimethylpropane	0.00	0.04	0.12
2,3,4-Trimethylpentane	0.00	0.26	1.20

Nonpolar Volatile Organic Compound	VOC Concentration (µg/m³)		
	Minimum	Average	Maximum
2,3-Dimethylbutane	0.11	0.39	1.78
2,3-Dimethylpentane	0.21	0.67	3.13
2,4-Dimethylhexane	0.04	0.15	0.58
2,4-Dimethylpentane	0.09	0.29	1.45
2,5-Dimethylhexane	0.03	0.11	0.51
2-Ethyl-1-Butene	0.00	0.03	0.19
2-Ethyltoluene	0.02	0.19	0.76
2-Methyl-1-butene	0.00	0.22	0.80
2-Methyl-2-butene	0.19	0.51	2.42
2-Methylheptane	0.00	0.22	0.60
2-Methylhexane	0.16	0.53	2.94
2-Methylpentane	0.44	1.62	7.88
3,6-Dimethyloctane	0.00	0.02	0.10
3-Ethyltoluene	0.04	0.45	1.90
3-Methyl-1-pentene	0.00	0.02	0.25
3-Methylheptane	0.00	0.23	1.05
3-Methylhexane	0.16	0.54	2.52
3-Methylpentane	0.26	0.96	6.02
4-Ethyltoluene	0.03	0.24	1.00
4-Methyl-1-pentene	0.00	0.02	0.11
4-Methylheptane	0.00	0.09	0.29
Acetylene	0.84	3.50	17.77
Benzene	0.44	1.34	4.12
Benzylchloride	0.00	0.03	0.06
Bromodichloromethane	0.00	0.05	0.19
Bromoform	0.00	0.04	0.09
Bromomethane	0.06	0.12	0.22
Bromotrichloromethane	0.00	0.00	0.00
Butane	0.83	4.74	19.88
Carbon tetrachloride	0.35	0.65	0.93
Chlorobenzene	0.00	0.00	0.08
Chloroethane	0.00	0.07	0.20
Chloroform	0.07	0.13	0.24
Chloromethane	0.80	1.07	1.50
cis-1,2-Dichloroethylene	0.00	0.02	0.07
cis-1,2-Dimethylcyclohexane	0.00	0.05	0.09
cis-1,3-Dichloropropene	0.00	0.00	0.00
cis-1,3-Dimethylcyclohexane	0.00	0.08	0.33
cis-1,4/t-1,3-Dimethylcyclohexane	0.00	0.03	0.12
cis-2-Butene	0.04	0.16	0.53

Nonpolar Volatile Organic Compound	VOC Concentration (µg/m³)		
	Minimum	Average	Maximum
cis-2-Heptene	0.00	0.02	0.21
cis-2-Hexene	0.00	0.04	0.29
cis-2-Pentene	0.06	0.25	0.83
cis-3-Heptene	0.00	0.00	0.21
cis-3-Methyl-2-pentene	0.00	0.07	0.39
cis-4-Methyl-2-pentene	0.00	0.06	0.28
Cyclohexane	0.04	0.19	0.92
Cyclohexene	0.00	0.04	0.13
Cyclopentane	0.07	0.27	0.98
Cyclopentene	0.02	0.07	0.25
Decane	0.06	0.28	0.94
Dibromochloromethane	0.00	0.03	0.11
Dibromomethane	0.00	0.07	0.17
Dichloromethane	0.25	1.66	20.63
Dodecane	0.00	0.09	0.27
EDB	0.00	0.03	0.11
Ethane	1.27	3.86	11.52
Ethylbenzene	0.23	0.78	3.28
Ethylbromide	0.00	0.01	0.09
Ethylene	0.82	3.42	10.38
Freon11	1.42	1.82	8.29
Freon113	0.50	0.71	0.94
Freon114	0.10	0.19	0.32
Freon12	2.19	3.04	24.40
Freon22	0.26	0.71	6.57
Heptane	0.14	0.49	2.34
Hexachlorobutadiene	0.00	0.00	0.00
Hexane	0.27	0.92	6.78
Hexylbenzene	0.00	0.02	0.09
Indane	0.00	0.10	0.34
Isobutane	0.50	2.03	9.31
iso-Butylbenzene	0.00	0.02	0.08
Isopentane	1.20	4.31	14.17
Isoprene	0.00	0.50	6.23
iso-Propylbenzene	0.02	0.05	0.16
m and p-Xylene	0.68	2.75	10.44
Methylcyclohexane	0.06	0.27	1.40
Methylcyclopentane	0.18	0.61	2.28
Naphthalene	0.00	0.35	1.76
n-Butylbenzene	0.00	0.04	0.15

Nonpolar Volatile Organic Compound	VOC Concentration (µg/m^3)		
	Minimum	Average	Maximum
Nonane	0.06	0.20	0.68
n-Propylbenzene	0.03	0.14	0.58
Octane	0.06	0.19	0.62
o-Xylene	0.29	0.94	3.78
p-Cymene	0.00	0.04	0.30
Pentane	0.53	1.82	5.75
Propane	1.20	4.20	12.31
Propylene	0.28	1.13	3.74
sec-Butylbenzene	0.00	0.02	0.08
Styrene	0.00	0.46	9.24
tert-Butylbenzene	0.00	0.01	0.06
Tetrachloroethene	0.08	0.77	5.30
Toluene	1.39	6.26	20.79
trans-1,2-Dichloroethylene	0.00	0.02	0.07
trans-1,2-Dimethylcyclohexane	0.00	0.05	0.20
trans-1,3-Dichloropropene	0.00	0.00	0.03
trans-1,4-Dimethylcyclohexane	0.00	0.03	0.14
trans-2-Butene	0.00	0.16	0.63
trans-2-Heptene	0.00	0.02	0.09
trans-2-Hexene	0.02	0.06	0.22
trans-2-Octene	0.00	0.02	0.14
trans-2-Pentene	0.04	0.18	1.15
trans-3-Heptene	0.00	0.00	0.05
trans-3-Methyl-2-pentene	0.00	0.05	0.34
trans-4-Methyl-2-pentene	0.00	0.05	0.57
Trichloroethylene	0.02	0.35	1.96
Undecane	0.00	0.19	0.67
Vinylchloride	0.00	0.01	0.06

*At the time of the analysis, the most recent Winnipeg data available for VOCs were for the years 1997 to 1999.

Table E.8. Summary of Winnipeg Data – Polar VOCs
Winnipeg Air Quality Monitoring Station: Ellen Street; Aldehyde/Ketone Special Study; March 11, 1997-December 31, 1999

Polar Volatile Organic Compound	VOC Concentration ($\mu g/m^3$)		
	Minimum	Average	Maximum
2-Butanone (MEK)	0.084	1.322	6.53
2-Butenal (E) (Crotonaldehyde)	0	0.171	1.789
2-Pentanone	0	0.138	1.171
2-Propenal (Acrolein)	0	0.110	0.393
Acetaldehyde	0.686	1.409	4.167
Acetone	1.274	3.913	12.25
Benzaldehyde	0	0.138	0.687
Hexanal	0	0.122	1.554
MIK (MIBK)	1	0.202	1.406
Pentanal (Valeraldehyde)	0	0.102	0.463
Propionaldehyde	0.116	0.379	0.958

Appendix F. Phase II Air Quality Data Observation Sheet

The following observation sheets were provided to selected Transcona residents in the vicinity of the Phase II monitoring site.

Transcona Special Air Quality Monitoring Project
November 2004 to February 2005

Observations of Air Quality Conditions

Observer: _____

Address: _____

Telephone: _____

Instructions:

- Thank you for participating in Manitoba Conservation's special air quality monitoring project currently underway in the Transcona area.
- From November 2004 to February 2005, we will be taking air samples in your community. These samples will be analyzed for fine particles (dust), metals associated with the particles, and volatile organic compounds.
- During this time period, we would like to know if you or members of your family notice any odours or other air quality problems.
- Please write down the date and time that you noticed the odours as well as any observations you might have. For example, you may wish to indicate whether you noticed a strong smell and the wind direction.

Date	Time	Observations
July 15, 2004	*4:15 p.m.*	*Smelled solvent-like odour (strong smell). Slight breeze from the south.*

- At the end of the monitoring program, please return the completed observation sheets to:

Manitoba Conservation, Air Quality Section
Attention: Jean Van Dusen
Suite 160, 123 Main Street
Winnipeg Manitoba R3C 1A5
Tel: 945-1671 Fax: 948-2357
Email: jvandusen@gov.mb.ca

Manitoba
Building for the Future

Transcona Special Air Quality Monitoring Project

Date	Time	Observations

Manitoba Conservation – Air Quality Section
Tel: 945-1671 Fax: 948-2357